Disturbing circles:

investigating the public role of UK higher education through the emergence of Grand Challenges

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I, Christopher James Mitchell, confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

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Abstract

My research project reflects on the public role of UK higher education through an investigation into the emergence of Grand Challenges. Grand Challenges are initiatives that bring people together to identify and address global problems, such as those that relate to health, wellbeing, climate change, security and sustainability. Universities promote them as an opportunity to make connections, develop transferable skills and to make a difference in the world. My research investigates how the emergence of Grand Challenges informs the debate about the public role of UK higher education through a critical analysis of why Grand Challenges have emerged, who they are for, and how they should be designed.

The research employs a methodological framework called critical realism, which involves identifying ‘generating mechanisms’ through an exploration of lived experiences and events. Within this framework, I use a combination of interviews and digital ethnography to identify three generating mechanisms that contribute towards the development of Grand Challenges in higher education. These relate to perceptions of precariousness, powerlessness and status. I use this analysis to reimage Grand Challenges by developing a new set of guiding principles. These principles are designed to help those in higher education to generate responses to complex global problems, to think together, to reflect on their obligations and to help people act in the world. They have already informed my own academic practice as a curriculum designer, and will be of value to those planning or participating in challenge-based education, as well as those developing higher education policy at the level of institution or sector.

Impact Statement

My research reimagines challenge-based education, proposing principles that rethink how educators engage students with problems that we collectively face. The research has been transformative for me. It has enabled me to reflect on why I work in higher education, and provided me with the intellectual framework to renew my professional practice as a teacher, student, manager and colleague. These guiding principles, and the process that I have gone through in identifying them, has helped me creatively respond to the challenges of living, working and studying through a pandemic.

The pandemic has brought into focus many of my research themes. It has reiterated how precarious our lives can be, and the ways in which we operate within complex networks of mutual dependency. It has shown the ways in which people can make a difference through small acts of kindness, whether that is raising money, delivering groceries or volunteering at a vaccination centre. It has also demonstrated how sufficient resource and political will can lead to extraordinary advances in short periods of time. It raises expectations of what could be possible in relation to other immediate and existential threats.

I have already implemented my conclusions at an institutional level. During the research, I was co-developing a new 30-credit core unit to bring students together across disciplines to make connections, think critically about their creative practice and generate innovative responses to complex problems. It is not a Grand Challenge, but it seeks to achieve many of the same ambitions. My guiding principles have been embedded into the design of the unit, which will launch at the start of the next academic year for over a thousand students. These students will be responding to global issues organised around four over-arching themes, culminating in a festival where student projects are shared, and archived for future participants.

My research informs those designing or delivering Grand Challenges, as well as those engaging students in interdisciplinary collaborative activity relating to social goals. I will present the recommendations of my research to the higher education community through a Staff Educational Development Association webinar and use this event as a means of building a network of those engaged in this form of practice. Through this, I intend to develop a collaborative resource to support participants, who often have little time in which to generate responses to complex, confusing and

changeable global challenges. In doing so, my research can guide future students faced with the same ‘wicked’ problem.

I intend to publish the results of this research in peer-reviewed journals to help ensure that I contribute towards the generation and discussion of new knowledge. I also intend to submit an article to Wonkhe, an organisation focused on higher education policy. In doing so, my research can inform policy-makers who are developing ideas for addressing social goals through higher learning. This includes policy-makers setting and responding to higher education policy at a national level, as well as policy-makers at an institutional level developing strategies for demonstrating social responsibility.

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Introduction

This thesis project has been a long time coming.

I have worked in higher education for almost twenty-five years. I left my undergraduate university in the summer without any idea what I wanted to do. Six months later I was back, this time as a junior member of staff. In between, I had spent four months managing a team of people processing savings application for a recently established bank. It was a miserable experience, lifted straight from the pages of a Joseph Heller novel. If, by chance, savings applications survived the process of sorting, stapling, re-stapling, verifying and filing all that would be achieved was that someone's money would be transferred to a bank barely competent to handle it. It did not seem to matter.

Returning to university meant making some small contribution to something that I thought did matter. At that time, I do not think I could tell you why; my sense of the public role of universities was only vaguely formed. With almost two and a half decades of experience of higher education in diverse roles across multiple institutions, I feel that I am in a better place to try to answer the question of what and who universities are for? There is no shortage of potential answers. Universities are expected to serve students by providing a 'fulfilling experience of higher education that enriches their lives and careers' (Office for Students, 2018), to serve governments by acting as 'engines of technological advance and economic prosperity' (Collini, 2012, p. 3) and to serve society by enabling positive individual, social and environmental transformation (UNESCO, 1998). Expectations are high. From within the walls of a higher education institution, I have often felt the frustration of those who feel that their expectations have not been met.

This thesis project has provided me an opportunity to critically reflect on what and who universities are for. It does so through an investigation into the emergence of Grand Challenges, a relatively new phenomenon in higher education. Grand Challenge is a term used to describe initiatives that bring people together to address global problems, such as those that relate to health and wellbeing, climate change, security and sustainability. They were first developed by government agencies and charitable foundations before being introduced to higher education for both taught and research students; University College London, the University of Cambridge, the University of Exeter, Imperial College London and Princeton University have all

launched high-profile Grand Challenge campaigns in the past decade. Dartmouth College now recruits academic staff to research clusters based around a global challenge rather than academic discipline (Bothwell, 2019).

I have chosen to focus on Grand Challenges because they serve as a useful microcosm of higher education. They are promoted to students as opportunities to make connections, develop transferable skills and to 'make a difference' (University of Exeter, 2019). They also hold the promise of economic and social transformation through small interventions that help to establish the 'intellectual basis for solutions to be found' (UCL, 2018). As such, they are celebrated for simultaneously serving students, governments and society. This thesis project investigates the extent to which these claims can be justified, and uses that critical analysis to interrogate the public role of UK higher education.

This thesis project builds on research that I have conducted throughout my doctorate. This includes an Institution Focused Study (IFS) that investigated postgraduate student expectations. This research concluded that there were significant differences between student expectations and the expectations ascribed to students by national policy-makers. Students were characterised by holistic approaches to their learning. They wanted a broad experience that enabled them to learn with other students, be guided by expert academic tutors, make work using high quality technical facilities, develop their professional identities and be supported be a network of dedicated professional services staff. National policy-makers were characterised by atomistic approaches to learning. They wanted institutions to provide detailed information about each individual element of the programmes so that student could make effective choices as consumers of higher education. This information includes programme-level data provided through Programme Specifications or Unit Descriptors, as well as institution-level data gathered through national benchmarking exercises. This research project helped to highlight the challenges that institutions face in making a case for what they do to stakeholders with competing interests. The research also draws on a Methods of Enquiry project that focused on student demand for interdisciplinary experiences that provided a useful context for understanding student attitudes towards and experiences of collaborative project-based education.

The title of my research project - '*Disturbing circles'* - refers to one account of the death of Archimedes, in which he was said to utter the words 'Do not disturb my circles' when challenged by a Roman soldier. According to this account he had drawn circles in the sand as part of an ongoing geometrical inquiry, even as his home city of Syracuse was being sacked by the Roman army (Polybius, 2010). As a historical figure Archimedes is held up as an exemplar of two contrasting ideals. One in which knowledge should 'improve some characteristic of the world where people live' (University of Manchester, 2021). Archimedes was held responsible for numerous discoveries in the fields of mathematics, physics, engineering and astronomy, as well as helping defend Syracuse from Roman invasion through the invention of war machines that battered, burnt and drowned the advancing soldiers. At the same time, he is described as being so focused on his studies that during the sack of Syracuse he curtly dismissed the Roman soldier sent to capture him, leading to his death.

I feel that the life and death of Archimedes provides a useful metaphor for the competing visions of what universities are for. He is portrayed both as someone determined to improve some characteristic of the world through the application of knowledge, and as someone unwilling to allow real and present dangers distract him from his studies. These are extreme positions. I do not believe that there is a single uncontested vision of what a university is for, nor am I seeking to provide one through this research. As Collini states, the debate between the 'useful' and 'useless' views of education has repeated on a loop since the 19th century and shows no sign of exhausting itself (Collini, 2012). I do, however, believe that this research project provides insight into how universities have responded to the demands placed on them, and the extent to which they have contributed to the mismatch between expectation and outcome. The Grand Challenges that have emerged in UK higher education provide an excellent opportunity to interrogate the relationship. This includes a discussion of the diverse perspectives that different stakeholders bring to the challenge of addressing global challenges. After all, the Roman soldiers in the siege of Syracuse will not have seen the machines that threatened their lives as evidence of any progress.

The key research question that runs through this thesis is: how does the emergence of Grand Challenges inform the debate about the public role of UK higher education?

Through this question I explored the confluences and contradictions of embracing Grand Challenges as a means of asserting – and possibly reclaiming – a sense of what universities are for. I investigated this by directly engaging with those responsibility for leading a Grand Challenge in a postgraduate institution in order to understand their motivations for doing so. I also observed one iteration of that Grand Challenge in order to explore how those intentions translated into practice, and critically analysed what that revealed about the purpose of and audience for such an initiative. I used this to develop my own response to the challenge of designing and delivering education that directly addresses social goals.

My resulting thesis is divided into the following chapters:

Chapter 1: Literature Review. This section explores the literature that has informed my research project and further defines my research questions.

Chapter 2: Methodology. This section outlines how I addressed my research questions, including discussion of my theoretical framework, research methods and engagement with research ethics.

Chapter 3: Results. This section presents an analysis of my research data organised into thematic headings that draws on both research methods employed.

Chapter 4: Discussion. This section reflects on the significance of my research project. It draws on both my literature review and my research data.

Chapter 5: Conclusion. This section provides a summary of my research project, including a distillation of key conclusions and recommendations.

Chapter 1: Literature Review

This literature review provides an overview of existing research relevant to my thesis. It provides a scholarly context for my research project, and enables me to explore the relationships, conflicts and absences with the field that have informed my investigations. It is divided into five sections, each of which explores a different aspect of the Grand Challenge. Section one focuses on the emergence of Grand Challenges as a concept and practice within the public, private and commercial sectors. This includes an investigation into the ways in which higher education institutions have sought to engage taught and research students in projects that address social goals. Section two focuses on collaboration as one of the defining characteristics of a Grand Challenge, and explores the extent to which that collaboration is necessarily an interdisciplinary one. Section three focuses on how increasingly globalised forms of communication, movement and thinking have informed the development of Grand Challenges, and of the broader ways in which universities have been shaped by and respond to their entanglement in complex global networks. Section four reflects on the public role of higher education and on the different ways in which that sense of publicness can be conceptualised, enacted and presented. Section five discusses the ways in which universities are free to set their own agendas and on the broader relationship between higher education, government and market forces.

Staying with the trouble: the emergence of Grand Challenges

This section provides a critical analysis of the emergence of Grand Challenges as a concept and practice. This provides a context to my interest in Grand Challenge as a worthy subject of research, and to the different ways in which Grand Challenges have been developed in the public, private and charitable sectors. The concept has been dated back to the 1900 International Congress of Mathematicians where German mathematician David Hilbert presented a list of ten unsolved mathematical problems that would ‘focus the efforts of mathematicians for the entire century and beyond’ (Uehara et al., 2013). This list was later expanded in publication to twenty-three problems. The problems included ‘Do all variation problems with certain boundary conditions have solutions?’ and ‘Is there a polyhedron that admits only an anisohedral tiling in three dimensions?’ (Hilbert, 1902). The purpose of Hilbert’s presentation was to challenge his peers to map the uncharted territory of the

discipline. As such, its contribution to new knowledge is the question rather than the solution.

Hilbert's challenge has been heralded as the first example of a 'Grand Challenge' because it identified problems of significance that had yet to be addressed, and invited others to address them (Stephan et al., 2015). These criteria could, however, be equally applied to earlier challenges, such as the 18th century search for a reliable method for determining longitude at sea (Sobel, 1996). Vest argues that the two defining characteristics of a Grand Challenge are difficulty and significance. He states that 'the precise path is unclear. That makes them challenging; and their deep importance makes them grand' (Vest, 2010). The issue of significance is a dividing line in the literature on Grand Challenges. Hilbert's challenge was inspired by an academic interest; while resolving the question of whether a polyhedron admits anisohedral tiling in three dimensions may have practical benefits, it is doubtful that that was Hilbert's original intention for posing the question, nor for those trying to answer it. For others, an essential element of the Grand Challenge is the anticipated impact that addressing the problem will have.

The first self-declared Grand Challenge project made the link between solution and application explicit. The term was coined as part of a US governmental research initiative focused on computing that sought to address 'a fundamental problem in science or engineering, with broad applications, whose solution would be enabled by the application of the high performance computing resources that could become available in the near future' (Federal Coordinating Council for Science, Engineering, and Technology, 1987, p. 3). This definition makes reference to the difficulty and significance of the Grand Challenge - 'a fundamental problem' - as well as its anticipated impact - 'with broad applications' - even if those anticipated applications are expressed vaguely.

Later definitions have addressed this by adding reference to both the stakes and the stakeholders for a Grand Challenge project. For example, Uehara et al. argue that Grand Challenge projects have three characteristics:

- They involve high-level goals or aspirations;
- They address important social problems that are broad and integrative;
- The problems appear solvable (Uehara et al., 2013)

The introduction of the second characteristic asserts the idea that Grand Challenges should seek to explicitly address social problems. Under this definition, Hilbert's twenty-three mathematical challenges should be reclassified as an intellectual challenge rather than a Grand Challenge. Similarly, this definition also excludes the first self-declared Grand Challenge project, which made no reference to social problems in its call to address fundamental problems in science and engineering.

The extent to which social problems are solvable is a critical issue to explore. Uehara et al.'s definition states that a Grand Challenge project should *appear* solvable. Hilbert's problems meet this criterion, even if some of the problems have latterly proven to be unsolvable because they were open to interpretation or because a solution has proven to be impossible. Those problems that have been resolved share one common characteristic: once solved, they stay solved. There is little call for anyone to investigate whether a polyhedron admits anisohedral tiling in three dimensions because Karl Reinhardt has already done so (Grunbaum & Shephard, 1980). His solution is available to anyone with the mathematical understanding necessary to make sense of it. Not all problems have this mathematical characteristic of being solvable.

Social problems may not be – or even appear to be – solvable. Rittel and Webber would describe this type of problem as one that defies formulation and is 'at best…only re-solved over and over again' (Rittel & Webber, 1973, p. 160). They introduced the term 'wicked problem' to describe the type of unique, interconnected and complex problems that operate within a dynamic open system. These problems cannot be solved because there is no 'stopping rule' or 'ultimate test'. Each action has consequences and every solution has the potential to become a symptom of another problem. This argument is not presented to absolve the planner from responsibility for their decisions. Rittel and Webber believe that the planner is liable. It does however, reject the idea that there is such a thing as a right or wrong solution. From this perspective, there are only better or worse solutions. As such, the aim is 'not to find the truth, but to improve some characteristic of the world where people live' (Rittel & Webber, 1973, p. 167).

Defining a Grand Challenge as a type of wicked problem changes the nature of the project. While the concerns of future generations should be considered alongside the present generation (Anand & Sen, 2000), the goal is no longer to make the world

safe for a future generation. Instead, the focus is on developing our capacity to immediately respond to challenges that we collectively face. Donna Haraway describes this as ‘staying with the trouble’. In rejecting a future-focused approach she champions the idea of ‘learning to be present, not as a vanishing pivot between awful or Edenic pasts and apocalyptic or salvific futures but as mortal critters entwined in myriad unfinished configurations of place, time, matters, meanings’ (Haraway, 2016, p. 1).

This idea of staying with the trouble is not one that has been commonly used in national and international Grand Challenges, which tend to emphasise notions of advancement and progress. The Grand Challenge approach has been used by a range of government agencies and non-government agencies. These include:

- Grand Challenges in Global Health: launched in 2003 by the Bill *and Melinda Gates Foundation* and the *Foundation for the National Institutes of Health* (Varmus et al., 2003)
- Grand Challenges for Development: launched in 2010 by the US Agency for International Development (US Agency for International Development, 2020)
- Grand Challenges Canada: launched by the Government of Canada in 2010 to save and improve lives in low- and lower-middle income countries (Grand Challenges Canada, 2012)
- UK Industrial Strategy Grand Challenges: launched in 2017 to put the United Kingdom at the forefront of the industries of the future (Department for Business, Energy & Industrial Strategy, 2017)

These Grand Challenges serve as strategy documents which define a body’s ambitions and the means by which those ambitions will be met. In the case of Grand Challenges issued by national governments, there is a potential tension between the global nature of the Grand Challenge and national self-interest. For example, the UK Government launched its own Grand Challenges initiative as part of an Industrial Strategy that focuses on four global trends that relate to areas of economic development: artificial intelligence and data, ageing society, clean growth and the future of mobility (Department for Business, Energy and Industrial Strategy, 2020). Each of these Challenges fits Uehara et al.’s definition in that they address important social problems that are ‘broad and integrative’. Where they differ, however, is in the

reasons for doing so. The explicit aim of the UK Government is to ‘put the UK at the forefront of the industries of the future, ensuring that the UK takes advantage of major global challenges’ (Department for Business, Energy and Industrial Strategy, 2020). As such, the aim of the Grand Challenge is not to solve a shared problem, but to advance the UK’s competitiveness in relation to other countries.

The sense of competitiveness that underlies these Grand Challenges is not new. Those seeking to solve Hilbert’s twenty-three problems may have been motivated by a similarly rivalrous spirit. What is different is the anticipated rewards. In this conception, a Grand Challenge is partisan project where one party is seeking to gain an advantage over another in an area of shared interest. As such, it becomes more of a private good that can be withheld, and only made available to those with the resources necessary to purchase it.

Not all national Grand Challenges appear as motivated by self-interest. For example, the Grand Challenges Canada project, which is funded by the Government of Canada aims to solve ‘some of the world’s most pressing health challenges’ (Grand Challenges Canada, 2012). This Grand Challenge places emphasis on the concept of ‘Integrated Innovation’, which involves a three-stage process where challenges are identified, innovators are supported, and solutions are ‘scaled-up’ by business leaders and entrepreneurs. The founding Chairman of the Grand Challenges Canada Board states that the new initiative has the potential to bring ‘transformational change to global health and foreign aid more broadly’ (Grand Challenges Canada, 2012, p. 2). In this, the project adopts a similar approach to that used by Grand Challenges issued by charitable foundations such as the *Bill and Melinda Gates Foundation*. Indeed, Grand Challenges Canada, Grand Challenges for Development, and the Grand Challenges in Global Health have now formed a partnership and also operate under the collective banner of ‘Global Grand Challenges’.

The ‘Global Grand Challenge’ organisations share a similar definition of a Grand Challenge that combines Uehara’s three aspects of high-level goals, integrative social problems and solvability. For example, the Grand Challenges in Global Health defines it as ‘a call for a specific scientific or technological innovation that would remove a critical barrier to solving an important health problem in the developing world with a high likelihood of global impact and feasibility’ (Varmus et al., 2003, p. 398). The idea of wealthy nations or individuals providing large-scale investment to

address shared concerns on health issues such as malaria, HIV, pneumonia and mental health appears attractive. There are, however, potential problems associated with a Grand Challenge functioning as a form of international aid or development.

Foremost of these concerns is the idea of solving a problem *on behalf* of rather than *with* a third party. The Varmus definition suggests that it is the responsibility of the 'developed world' to support 'the developing world'. This introduces a problematic divide between those who consider themselves to have achieved maturity as nations, and those that are deemed as too immature to care for themselves. This both risks denying 'developing' nations agency in identifying and addressing their own problems and ignoring the extent to which 'developed' nations may be directly or indirectly responsible for the problems that other nations face.

The Grand Challenges issued by philanthropic organisations such as the *Bill and Melinda Gates Foundation* have achieved success in reducing the impact of infectious diseases such as malaria and polio. Pharmaceutical companies are unlikely to have devoted equivalent time, resource and energy to combating these diseases because there is no obvious profit to be had in the areas most affected by them. The scale of this philanthropic endeavour also raises ethical concerns, even setting aside the question of how that wealth was generated. It may not be in society's best interests to enable individuals to accrue vast wealth and use that wealth to determine the development priorities of the world. For example, despite the successes that the Global Challenges in Global Health has achieved, those resources might have been better channelled towards local health priorities determined by those directly affected (Vallely, 2020).

Setting the agenda has always been part of the Grand Challenge story, from David Hilbert onwards. From one perspective this can involve narrowing the scope of the challenge to a technocratic exercise that purposely avoids discussion of alternative futures. For example, it could be argued that in framing the Grand Challenges in Global Health around 'specific innovations' that remove 'critical barriers', the initiative leaves little space for discussion of the mechanisms that generate health inequalities. Equally, Grand Challenges have also been used as a campaigning tool. In discussing the impact of Grand Challenges Canada, Singer and Brook identify the broader policy implications of capturing the public's interest and imagination, securing resources and providing a focus for collective action (Grand Challenges Canada,

2012). These motivations echo those of the Grand Challenges issued by academic institutions and scholarly associations who can offer little in comparison to the Grand Challenges bankrolled by governments and billionaire philanthropists. For example, O'Donnell argues that the Grand Challenge launched by the US National Academy of Engineering (NAE) 2008 proved transformative by bridging the divide between practice and research, promoting recognition of engineering among the general public, redirecting research towards practical problems and inspiring a new generation of engineering students (O'Donnell, 2012).

The aims of a Grand Challenge have shifted as the initiative has made its transition to higher education. In the UK, higher-education based Grand Challenges are promoted to students as opportunities to gain insight into complex problems through experiential learning, to develop key transferable skills, to expand their personal and professional networks, and to make a difference in the world (Burkett et al., 2015). As such, they potentially appear to more focused on developing students as 'agents of transformation', providing students with the motivation and means to engage with shared problems beyond their studies. Some universities, such as University College London, the University of Cambridge and Cranfield University, run Grand Challenge schemes directed at research students to encourage them to engage directly with industry, government, community and academic partners. The UCL example is explicit about seeking to establish the 'intellectual basis' for problems to be meaningfully confronted (UCL, 2018). Other universities, such as the University of Exeter (2019b) and the University of Manchester (2021), run Grand Challenge schemes directed at taught students.

While all Grand Challenges share the ambition to 'make a difference', there may be a significant distinction between government or charity-based initiatives that are backed by significant resources and those run by academic institutions. For resource-rich Grand Challenges, success may be defined by external impact; i.e. the extent to which the challenge has been met. For resource-light Grand Challenges success may be defined by the impact on those taking part or – more nebulously – on the extent to which that participation has created the conditions for future transformation. Equally, it could be that a Grand Challenge functions more as a demonstration of a university's public purpose and that the motivations are more self-serving than altruistic.

Grand Challenges have also helped to inspire the idea of 'Challenge-based Learning', an approach to primary and secondary education which is 'is designed to equip a new generation of students to solve real problems, develop 21st century skills, and make a difference in their community and the world' (Cator & Nichols, 2008, p. 8). Challenge-based Learning emerged from the 'Apple Classrooms of Tomorrow – Today' project developed by the multinational technology company. It takes at its starting point the argument that 'traditional' teaching and learning strategies are increasingly ineffective in an information age. Challenge-based Learning involves a three staged framework that invites students to *engage* through a process described as essential questioning, *investigate* potential solutions, and *act* by implementing those solutions with an 'authentic' audience. Participants are then encouraged to publish their solutions. It is presented as a means to 'address the myriad challenges facing our world, country, and communities' through combining powerful ideas, youthful creativity and cutting edge technology (Cator & Nichols, 2008, p. 8). As such, the key difference between a Grand Challenge and Challenge-based Learning is the age of the participants rather than nature of the initiative, or its ambitions.

The idea of Challenge-based Learning owes much to the existing approaches such as Project-based learning and Action Research. In Project-based learning, students learn through exploration of authentic problems as a means of motivating them to engage with new ideas and ways of thinking. It is inspired by constructivist thinkers such as John Dewey (1956) and Jean Piaget (1970) who argue that learning should build from the experience of learners. As such, it eschews a deficit approach – which seeks to remedy the learner's lack of pre-defined knowledge – and encourages them to find meaning through their engagement with self-directed learning as a lifelong process. It differs from Challenge-based Learning in that students are not expected to act in the world as part of that process; its principal focus is on supporting student learning.

In contrast to Project-based Learning, Action Research is wholly focused on action. It was initially developed by Kurt Lewin as a means of addressing two 'basic facts' about intergroup relations in the US: that there is a good deal of good-will to do something, and that the problem is transforming good-will into effective action (Lewin, 1946). He described a situation in which 'these eager people feel to be in the fog'

(Lewin, 1946, p. 34). Action Research was developed as a means of helping people to navigate through this fog with an iterative cycle that involves planning, acting, observing and reflecting. It aims to be transformative by encouraging those engaged in the research to reflect on what they are doing, why they are doing it, and how they could improve on what they are doing (McNiff, 2011). As such, the intended outcome of Action Research is the renewal of the researcher's own practice, rather than persuading others to think or act differently. Action research differs from Challenge-based learning because it is focused on the micro-level. While action researchers may choose to locate their project within a broader context, emphasis is placed on things that are within the control of the researcher. This can mean that it addresses symptoms rather than causes.

The borders between these different forms of learning are fuzzy ones. In practice, it may be that different terms are used to describe very similar activities. I do, however, feel that the definitions used to describe the term 'Grand Challenge' in my literature review do not sufficiently capture the nature of the initiative as it has evolved through several iterations across different sectors. Both the Uehara and Grand Challenges in Global Health definitions place too much emphasis on providing – or appearing to provide – solutions to problems that are fundamentally unsolvable. For a complex, uncertain and changing world there are no stopping points. Equally, the existing definitions fail to encompass Grand Challenges that aim to inspire action as well as take action. As such, I have developed my own definition that addresses these concerns and provides me with a more solid foundation for my research.

For this thesis project, I am defining a Grand Challenge as an initiative that encourages participants to collaboratively develop ideas to address global concerns. It has three characteristics:

- It aims to inspire an interest in a shared concern
- It aims to improve some aspect of the world
- It aims to impel action.

This definition distils the key characteristics of a Grand Challenge by encompassing intentions, process and outcomes. It also recognises the extent to which contemporary Grand Challenges have an advocacy role, which involves both leading and supporting change through raising awareness of issues. The next section

explores why I have identified collaboration as a defining characteristic of a Grand Challenge, and why I consider interdisciplinarity as a likely characteristic rather than a necessary one.

The clashing point: exploring the spaces between disciplines

I have defined collaboration is an essential element of a Grand Challenge. Participating students are expected to work within project teams to address global concerns. For Grand Challenges set within higher education institutions this collaboration has often involved bringing together different academic disciplines and cultures at the 'clashing point' (Snow, 1959). Fung argues that this is because there is a 'growing need to prepare students for crosscutting forms of enquiry in a world where challenges are so complex and profoundly interconnected' (Fung, 2017, p. 69). Indeed, the higher education institutions that adopt interdisciplinary approaches to their Grand Challenge present that as a key selling point. For example, the UCL Grand Challenge is 'based on the premise that solutions to the greatest challenges rarely come from one field alone' (UCL, 2018). From this perspective, complex challenges are best addressed holistically, rather than through the narrow lens of a single discipline. To assess this claim, it is necessary to reflect on the history and development of academic disciplines.

Academic disciplines have been defined as 'scholarly communications that define which problems should be studied, advance certain concepts and organising theories, embrace certain methods of investigation…and offer career paths for scholars' (Repko, 2008, p. 1). This definition embraces the idea that disciplines encompass an area of study, an approach to study, and a community of scholars. Disciplines have come to be a fundamental part of the social structure of many universities, with cognate disciplines organised into distinct Schools, Faculties or Colleges. Some specialist institutions focus exclusively on particular disciplines. For example, in London alone there are highly regarded specialist higher education institutions focused on Art & Design, Business, Economics & Political Science, Education, Hygiene & Tropical Medicine, Science & Technology, Speech & Drama, and Veterinary Science, among others.

Academic disciplines are thought to owe their origins to the development of the modern research university in the 19th century (Graff, 2015). German and US institutions, in particular, have been considered the pioneers for this development

(Burke, 2012). Becher describes disciplines as ‘tribes’ with ‘recognisable identities and cultural attributes’ (Becher, 2001, p. 44). Belonging is reinforced through various means, including the maintenance of idols such as the ‘pictures on the walls and dustjackets of books kept in view’ (Clark, 1980). Becher describes how these tribes may occasionally send out ‘raiding parties’ to steal from neighbours or form temporary alliances. These alliances can become longer-lasting. Graff describes the tension in academic institutions between preserving established disciplines and enabling the development of new ‘interdisciplines’ that bring together elements from established disciplines to create something new (Graff, 2015).

The development of disciplines may have a more profound influence than determining what we know and how we learn it. Meyer and Land argue that they also shape how we think (2003). They describe the process by which individuals are inducted into disciplines through internalisation of ‘threshold concepts’ which address aspects of ‘troublesome knowledge’. A key characteristic of a threshold concept is that it is irreversible; once internalised it forms part of someone’s world view. So, for example, a geologist who has internalised the concept of plate tectonics will view all geological evidence through this lens, as a biologist would view the world through the lens of the concept of evolution.

McCulloch and Cowan argue that frustrations with the limits of disciplinary thinking became prominent in the 1960s (McCulloch & Cowan, 2017). For example, a 1966 Organisation of Economic Co-operation and Development (OECD) report stated that ‘the disciplinary and departmental structure of the European University [is] an obsolete division of labour…tending to encourage rigidity, conservatism, economic weakness and fragmentation (Martinotti, 1999, as quoted in McCulloch & Cowan, 2017, p. 16). Briggs argued that the academy was characterised by ‘rivalry and occasional friction, boundary disputes and far from splendid isolation’ (Briggs, 1961, pp. 10–11). In 1975, a subsequent Nuffield Foundation report argued that the obstacles for making connections across disciplines owed more to social, professional and organisation factors than academic ones (Nuffield Foundation, 1975). As such, disciplines were being held responsible for bounding knowledge rather than advancing it by creating ‘autonomous fiefs’ where people and ideas were deliberately kept apart (Centre for Educational Research and Innovation, 1972). Deprez and Wood describe this as ‘circling the wagons’ in order to ‘reaffirm their

place in the academy, to protect academic freedom and to compete for resources' (Deprez & Wood, 2013, p. 145). From these perspectives, Land and Meer's *threshold concepts* might function more as blinkers than lenses.

Cross-disciplinary thinking has been heralded as a means of addressing these limitations, particularly in relation to the kind of complex societal problems confronted through a Grand Challenge. Authors such as Petrie (1976) and Klein (2017) have developed definitions of different forms of cross-disciplinarity activity, which can be summarised as follows:

- *Multidisciplinarity*: coordinating different disciplines
- *Interdisciplinarity*: integrating different disciplines
- *Transdisciplinarity*: transcending different disciplines

All of these involve people working together on shared projects. In the case of multidisciplinarity, that collaboration can be at-a-distance so that each disciplinary contribution can be discrete. Within interdisciplinarity, the collaboration is fully integrated so that different disciplinary perspectives are shared and combined to create new thinking. Both multidisciplinary and interdisciplinary approaches recognise the value of established disciplines and the unique contribution that each makes to addressing common challenges. As such, they represent no threat to their intellectual, professional and social foundations. Transdisciplinarity, on the other hand, looks beyond existing structures to develop networks that are open, dynamic and transgressive (Klein, 2017). Gibbons describes this as 'Mode 2 knowledge' that is non-hierarchal and non-institutional in nature and where 'preference [is] given to collaborative rather than individual performance and excellence' (Gibbons et al., 1994, p. 30). Arguably, this networked approach sits uncomfortably within a higher education system in which academics and institutions are in competition for funding and status through publications, grants and ranking exercises.

The Grand Challenges situated within UK higher educational instructions generally fit within two categories: either they are bound within a single discipline or adopt an interdisciplinary approach. Those adopting an interdisciplinary approach share common characteristics with previous interdisciplinary initiatives within higher education. These include a belief that the universities have a responsibility to address the problems of the world, and that these problems are best addressed

through knowledge co-created through collaboration within and between disciplines. This emphasis on co-creation is an important one. For example, John Walton argues that local initiatives such as the School of Independent Studies established at Lancaster University in 1973 represented part of a radical shift towards more student-led approaches to learning (Walton, 2015) that place as much emphasis on looking forward as looking back. As Beloff writes in relation to the introduction of multidisciplinary schools at the University of Sussex in the 1960s, students were encouraged to 'concern themselves with contemporary as well as inherited culture, with history in the making as well as history that is already made' (Beloff, 1968, p. 89).

These initiatives sought to inform how students act in the world by providing them a space to critically consider key issues and questions, and by focusing on the development of their 'transferable skills'. Klein identifies a number of traits of the 'interdisciplinary individual', which include reliability, flexibility, resilience, risk-taking, and sensitivity to others (Klein, 1990). As such, it is through the process of interdisciplinary collaboration that participants can engage more openly in an intellectual and practical exploration of the chosen issue. This generates both a clashing point and an opportunity to learn how to work effectively with those different to you. Part of this involves 'unsedimenting' individuals from their discipline once they have been inducted into it (Millar, 2016). That may be why the majority of interdisciplinary education is situated at the postgraduate level (Lyall et al., 2015). In contrast to authors such as Bentley (2007) and MacKinnon et al. (2013), Davies & Devlin (2007) argue that this is because students should be familiar with the 'vocabularies' of their own discipline before they engage with others. They state that 'it is as important to teach the language and technical terms of the disciplines, as it is to teach the methodologies, procedures and concepts (indeed, they cannot be taught without the language)' (Davies & Devlin, 2007, p. 5).

Another trait that many interdisciplinary initiatives share in common is their ephemerality. Both Walton and Elton (1981) agree that it is difficult for them to 'take root' within university structures that regard them as 'untidy and hard to 'manage'' (Walton, 2015, p. 15). Even innovations that have been actively championed by university senior management, such as those at the University of Sussex, have not endured. In part, this could be explained by participating staff failing to form a long-

lasting attachment to the initiative, and wanting to return to the security of their own tribe. For example, a Higher Education Academy report found that three-quarters of programme directors surveyed felt that staff wanted to 'teach their usual modules in familiar subjects and not become involved in the type of synthesis promised through interdisciplinarity (Lyall et al., 2015, p. 27). Equally, there may also be active resistance to initiatives that threaten to instrumentalise teaching and research activities, and are so directly tied to immediate local, national or international goals. Rizvi and Lingard argue that this kind of approach can be co-opted by governments and can represent part of a reconstitution of education as 'a central arm of national economic policy, as well as being central to the imagined community the nation wishes to construct' (Rizvi & Lingard, 2010, p. 96).

The success of interdisciplinarity within higher education may not be tied to its endurance. In fact, initiatives like Grand Challenge might represent a fleeting act of resistance against the hyper-specialisation of an academic discipline that keeps us from 'seeing the global (which it fragments) and the essential (which it dissolves)' (Morin, 2001, p. 34). Interdisciplinarity also does not need to present a threat to disciplinarity. Indeed, it could be argued to strengthen academic disciplines by enabling members of the academic community to look over the 'low walls' between them and appreciate the differences; sometimes you can only see something when you stand apart from it.

This is not enough to persuade me to include interdisciplinarity as a necessary characteristic of a Grand Challenge. Using my earlier definition, it is possible to collaboratively inspire interest in a shared concern, improve some aspect of the world and impel action from within a single discipline. For this thesis project it is, however, important to appreciate how the Grand Challenge sits within the long-standing tradition of interdisciplinarity within higher education, and why so many Grand Challenges are founded on the principle that a free circulation of perspectives, ideas and approaches across disciplines is the means to creating novel thinking.

Feeling the fear: globalisation and higher education

Part of the Grandness of a Grand Challenge is the scale at which it operates. This reflects how advances in communications and transportation have 'shrunk the world', creating complex networks of mutual dependency. For example, a phone sold in the UK can be designed in the US and assembled in China with parts manufactured in

dozens of countries around the world using raw materials extracted from places as diverse as Mongolia and Chile (Rodriguez et al., 2015). This process has been linked to the advance of capitalist modes of production (Marx, 1992), which serve to alienate individuals from the products of their labour so that even the production of a commonplace item such as a pencil becomes too complex for an individual to comprehend (Read, 2010). A Stockholm Environment Institute's report describes this as part of a 'Great Transition' where the 'increasing complexity and scale of the human project has reached a planetary scale' (Raskin et al., 2002, p. 6). The report argues that this process creates disquieting uncertainties that include environmental risks, economic instabilities and socio-political combustibility. Gasper argues that 'turbo-capitalism' is particularly vulnerable because it creates the conditions for shocks, is highly sensitive to the disruption caused and has a low coping capacity (Gasper, 2013).

The global response to the Covid-19 pandemic is perhaps an example of this vulnerability, with the virus rapidly spreading and mutating across the world, with a terrible cost of lives, and large-scale disruption to integrated systems such as the supply and distribution of food. It could be argued that this interconnectedness also extends to our social lives, where the murder of a black man by a white police officer in the US state of Minnesota led to a global social justice movement that involved almost 4,500 protests from Buenos Aires to Tromsø (WBUR, 2020).

These processes have been grouped under the term 'globalisation', although Babones concludes that the term 'means many things to many people, so many things that it hardly seems worth offering yet one more definition' (2007, p. 144). Babones suggests that 'generic' definitions of globalisation tend to subdivide in three ways: economic globalisation, cultural globalisation and political globalisation (2007, p. 146). These operational aspects all describe the various ways in which people, goods, services, ideas and movements can move across national boundaries with increasing ease. Ritzer also discusses the theoretical aspects of the term, which are characterised by debates between enthusiastic 'globophiles' and sceptical 'globophobes' (Ritzer, 2007). He argues that globophobia is equally common across the political spectrum, although the nature of the concerns is different; those on the left are more concerned about the injustices of the neoliberal project, and those on the right are more concerned about threats to national autonomy and identify.

The threats of globalisation may not be felt equally across the world. For example, a recent ‘World Risk Poll’ conducted by the Lloyd’s Register Foundation and Gallup surveyed 150,000 people in 142 countries, and found major differences in perceptions of safety between different groups (Lloyds Register Foundation, 2020). Overall, more people felt safe or safer than five years ago largely because perceptions of risk had fallen in East Asia. In Latin America & the Caribbean, Southern Africa, Southern Europe and Northern/Western Europe perceptions of risk had significantly increased. The survey found little relationship between perception of risk and the likelihood of experiencing harm. Highest concerns related to immediate threats such as road safety, crime/violence and health. Existential threats such as the climate crisis were identified as concerns, although those in countries that contributed most carbon to the atmosphere – such as China and the US – were often least concerned. It is also worth remembering that the economic, cultural and political forces of globalisation bring opportunities as well as threats.

Higher education has identified many ways in which to harness the forces of globalisation. For example, the development of near-instantaneous mechanisms for sharing information and knowledge has enabled new ways of engaging with the world so that academics can, say, remotely investigate the black-market sale of antiquities (Scatena, 2020), search for extra-terrestrial life (Korpela et al., 2011) and monitor active volcanoes (Pyle et al., 2013). It has also led to changes to who studies at university. For example, the Organisation for Economic Cooperation and Development (OECD) estimated that between 2000 – 2011 almost 4.5 million tertiary students were enrolled in programmes outside of their country of origin, a two-fold increase on the previous period (OECD, 2013). For those able to afford fees, livings costs and travel, the choices are abundant.

The impact of this ‘internationalisation’ of higher education has generated significant academic and policy interest. The institutional advantages of recruiting on a global scale are significant. International student recruitment is less likely to be bound by the same rules as ‘home’ student recruitment in relation to fees, subsidies and recruitment caps. As such, international student recruitment enables institutions to increase the number and quality of student applications and generate significant additional revenues by charging higher tuition fees. It also enables institutions to develop new models of transnational education including exchange schemes, joint

awards and international branch campuses (Knight, 2016). This rapid expansion in student mobility has implications beyond university financing.

Within the literature, a key debate is the extent that universities recognise both the opportunities and responsibilities involved in the internationalisation process. There has been a significant shift in how this has been discussed. Contemporary authors tend to reject approaches that are primarily concerned with helping international students adapt to dominant 'home' cultures, languages and practices. This 'deficit modelling' perpetuates national stereotypes and increases the risk that the integrity of academic judgements are compromised by unconscious biases (Equality Challenge Unit, 2013). In contrast, they discuss the ways in which international student recruitment enhances 'the quality of education and research for all students and staff' (de Wit et al., 2015, p. 29) by bringing together more diverse ideas, perspectives and experiences.

A number of UK higher education providers have enthusiastically embraced the idea of being global institutions. For example, the King's College London Strategic Vision 2029 describes the institution as 'at the heart of national and international networks' and being 'of London, for the world' (King's College London, 2017, p. 5). Authors such as de Wit & Jones (2022), Killick (2018) and Marginson (2007) have, however, urged caution about the idea of inclusive 'post-national' institutions on the grounds that this 'global exchange is by no means symmetrical' (Marginson, 2007, p. 41). From these perspectives, internationalism has the potential of further concentrating power, people and resources at the research-intensive Anglo-western universities that tend to dominate global league tables. In doing so, the internationalisation of higher education threatens to 'both reflect and exacerbate the inequalities in global societies' (de Wit & Jones, 2022, p. 142). For example, all of the top fifteen universities in the Times Higher Education's 2022 World University Rankings are from Anglo-western institutions (Timer Higher Education, 2021). Fourteen of those institutions are based in two countries.

A further criticism of university efforts to embrace globalisation through internationalisation is the extent to which international students are presented as an undifferentiated mass, rather than representing a diversity of highly specific local contexts. This universalist approach can also serve to obscure the implicit norms, values and beliefs encoded within the 'hidden curriculum' (Margolis, 2001). For

example, the recent decolonisation movement has highlighted the extent to which higher education has been shaped by a legacy of colonialism that is sustained through the 'whiteness' of the curriculum (Gopal, 2021), degree attainment gaps (Bunce et al., 2021), and the people who are celebrated in university spaces (Timalsina, 2021). University efforts to address these concerns have been criticised for failing to challenge systemic causes of inequality (Bendix et al., 2020), often with reference to Audre Lorde's assertion that the master's tools will not dismantle the master's house (Lorde, 2018). De Wit and Jones argue that this transition from a 'western, competitive paradigm to a global cooperative strategy' (de Wit & Jones, 2022, p. 148) is not an easy one, but nonetheless it is one worth making.

This task is made more difficult because higher education institutions both shape and fall victim to these forces. Barnett, states that the challenge of complexity has two defining characteristics 1) situations where the capacity of individual entities is overwhelmed by the demands placed upon them 2) situations where the entities themselves are contributing to the problems through their own interactions (Barnett, 1999). Individuals or groups have little hope of making sense of the excessive noise generated through these dynamic systems, leading to confusion and uncertainty. He extends this concept further by coining the term *supercomplexity* to describe the situation where even our shared frameworks for understanding and engaging with each other are contested. Without a clear sense of our individual or collective identities, and our responsibilities to each other, there are no fixed points for each of us to orient around. Within this model there are no solutions, only multiplying and conflicting answers. The world becomes 'radically unknowable' (Barnett, 1999, p. 77).

An unknowable world creates problems both for universities and for those designing, delivering and participating in Grand Challenges. Within supercomplex systems institutions risk ceding responsibility for setting their own agendas and attempt - and fail - to meet the excessive and conflicting demands of others. These demands include advancing knowledge for its own sake, advancing knowledge for the benefit of society, championing social equality and justice, stimulating the local and national economies, transforming student lives and outcomes, delivering social mobility and leading responsibility for the health and wellbeing of its community. In doing so, the popular narrative for universities becomes one of failure, which only serves to further

undermine the sector's confidence in its own mission. This has been argued to be an explicit goal of those who would seek to bring 'universities to heel' (Collini, 2011).

The shifting sands of a supercomplex world also make it difficult to achieve any of the three characteristics I have defined as fundamental to a Grand Challenge. Attempting to inspire an interest in a shared concern may just add to the confusion by generating more noise. Equally, the knowledge that each new action has the potential for causing more harm than good can lead to inertia. The popular notion of 'feeling the fear and doing it anyway' may not be so attractive when others bear the burden of your risk-taking. Barnett argues that universities should embrace this uncertainty by helping students live at ease within this 'perplexing and unsettling environment' (Barnett, 1999, p. 154). This involves firstly creating epistemological and ontological 'disturbances' in the minds and being of students. In isolation this would only serve to increase their sense of anxiety. Universities should subsequently support students to develop the 'ethical anchoring' necessary to navigate this dislocation, and to enable them to make a positive contribution to the world. In doing so, Barnett borrows from Scott's idea of 'reflexive biographies' (Scott, 1995) in centring this process around the idea of purposeful action. As such, students are encouraged to have the boldness to commit to action despite the recognition that the consequences of that action are ultimately unknowable.

This argument changes the nature of what initiatives such as Grand Challenges can achieve. Within this model, participating students become the subject of the Grand Challenge. It exists to provide them with the means to understand each other and develop strategies for operating within an 'ecology of action' where decisions can have unforeseen consequences. These consequence include *perverse effects* - which cause more harm than good – *innovational inanities* – which generate noise without benefit – and *imperilling acquisitions* – which undermine liberty and/or security (Morin, 2001, p. 73). As such, as soon as a person acts, that action 'starts to escape from his intentions' (Morin, 2001, p. 71).

In his 'Seven complex lessons in education for the future' Morin argues that higher education institutions can become 'instruments of change' through the promotion of an 'earth identify' that acknowledges that 'the planet is not a global system; it is a moving whirlwind with no organising centre' (Morin, 2001, p. 52). Morin argues that we should extend our sense of mutual belonging out beyond our national boundaries

and embrace the idea that recognises that ‘all human beings have the same basic life-and-death problems…sharing a common fate’ (Morin, 2001, p. 62). This has echoes of the human capability approach. For example, Nussbaum identifies three capabilities that are ‘essential to the cultivation of democratic citizenship in today’s world’ (Nussbaum, 2006). These are the capacity for critical examination, the recognition of our shared bonds and the ‘narrative imagination’ to empathise with others.

Embracing a collective ‘earth identity’ also raises questions of who defines what that identity is. Global citizenship programmes have been criticised for promoting hollow displays of solidarity (Bryan, 2016) and for prompting a forms of citizenship that focuses on individualised actions (Wilde, 2016). Participants are encouraged to ‘make a difference’ but fail to interrogate the systemic causes of inequality, thereby constraining people’s imagination about what can be achieved. Problems are addressed on behalf of others, rather than with them so that they become passive objects of study. These initiatives tend to generate easy solutions to complex problems that focus on individual actions rather than collective ones. Equally, they ignore ‘inconvenient truths’ about the extent to which individually and collectively we contribute to the suffering of others (inadvertently or otherwise).

This ‘civilising mission’ has been criticised for encouraging students to ‘project their beliefs and myths as universal and reproduce power relations and violence similar to those in colonial times’ (Andreotti, 2016, p. 22). As such, ‘universal values’ that are assumed to be held in common represent local interests that are globalised through domination of political spaces. For example, in dismissing those who adopt ‘ancestral and mythical’ identities as a rejection of planetary thinking, Morin does not appear to consider the real and unwelcome threat that globalisation presents to local identities, cultures or interests. In her analysis of the ‘Make Poverty History’ initiative, Andreotti draws on Dobson (Dobson, 2005) to argue that the campaign focuses on moral obligations to act over political responsibilities. She argues that this both serves to reproduce patterns of inequality and make any resolutions fragile as moral obligations are easier to withdraw than political ones. Taylor describes this as a form of ‘emotional tourism’ which enhances the moral purpose and well-being of campaigners without addressing the root causes of the suffering of others (Taylor, 2011).

Globalisation presents universities with a major challenge: how do you meaningfully respond to it without appearing self-serving, or making the situation worse? To address this question, Andreotti developed a framework for distinguishing between forms of citizenship education. This framework is founded on the idea that students need to develop a 'critical literacy' that enables them to 'reflect on their context and their own and others' epistemological and ontological assumptions' without reference to fundamental truths (Andreotti, 2016, p. 27). 'Soft' forms of global citizenship education use a deficit model that identifies things that one group lacks - such as education, skills, resources, technology, culture etc. - and develops proposals for addressing that deficit because it is the 'right thing to do'. The 'beneficiaries' of this aid are passive, unable to help themselves. 'Critical' forms of global citizenship education explicitly confront the complex structures that lead to inequality and injustice. They acknowledge that we are all part of the problem and the solution, and argue that we have a responsibility *towards* others, rather than a responsibility *for* others. Critical global citizenship emphasises people's autonomy to identity and address their own development needs. As such, it raises fundamental questions about the nature of the higher education, and on the relationship between higher education and society.

Throwing yourself to the ground and missing: the public role of higher education

Understanding what motivates a university to develop a Grand Challenge requires a broader discussion on the public role of higher education. This section of my literature review places the emergence of Grand Challenges within a broader context of literature that examines what universities are for. This has been an ongoing debate since the idea of a university was first developed. There are several competing claims on the title of the oldest university that include the University of al-Qarawinyyin in Morocco (Lulat, 2005), the University of Bologna in Italy (Ridder-Symoens & Rüegg, 2003) and Nalanda in India (Sankalia, 1934), among many others. Lowe and Yasuhara argue that many different centres of higher learning were established throughout the ancient and medieval worlds and that 'each civilisation developed its own distinctive ways of pursuing knowledge' (Lowe & Yasuhara, 2016, p. 8). Each example involves a select community of people coming together to develop, document and share knowledge. Over time some of those communities have become described as 'universities' and have been conferred with 'degree-awarding'

powers that enable them to validate the knowledge of others. It has been estimated that there are now over 26,000 universities worldwide (Sowter, 2017).

In a Western context, the founding principles of public higher education are often associated with the work of Wilhelm von Humboldt, who founded the University of Berlin in 1810 (Anderson, 2004). In common with other enlightenment thinkers Humboldt's ideas were informed by his study of classic Greek literature and civilisation, which he regarded as a model of rational enquiry. Humboldt believed that the purpose of universities should be to develop autonomous individuals who are both guided by reason and share a collective bond as citizens of the world. To achieve this, he argued that universities should be granted 'academic freedom' to pursue their own agendas independent from government. In doing so, Humboldt advocated bringing together teaching and research so that those engaged in research would be responsible for sharing it with their students, thereby inspiring them by example. From this perspective, Grand Challenges represents the latest iteration of a longstanding ambition to directly engage higher education students with the principles and practices of research.

Deciding what to be curious about has become a key pillar of the debate about the future of universities. Humboldt's assertion that academics should be free to choose what they research and teach has been echoed by authors such as Cardinal John Henry Newman, who argued that the defining characteristic of a university should be stimulating the intellectual curiosity of students (Newman, 1960). Newman is often quoted for his description of knowledge as 'an end sufficient to rest in' (Newman, 1960, p. 78). This notion has not always proved popular, and may be one reason that universities have long been described as 'ivory towers' that set themselves apart from the cares of the world (Shapin, 2012). Scholars are celebrated when they are seen to apply their intellect in service of practical goals, whether it is Archimedes defending Syracuse from the Romans by designing war machines that included a 'ship-shaking' crane-operated claw (Polybius, 2010) or the development of vaccines that address contagious diseases such as polio (Seytre & Shaffer, 2005)

Culture has been identified as another founding principle of a university. For example, Readings draws on his analysis of German Idealist thinkers to argue that the university is a 'site of critique' (Readings, 1996, p. 6) where members are encouraged to exercise their critical faculties to challenge assumptions and

orthodoxies. The term ‘culture’ is a slippery one, that has been broadly used to describe ‘a general process of intellectual, spiritual and aesthetic development’ (Williams, 2013, p. 80). Williams argues that this culture of critique has the potential to draw universities into conflict with local and national governments, who may have limited enthusiasm for being challenged in this way. For example, he discusses the hollowness of the language of ‘excellence’ used by policy-makers that presents the pursuit of knowledge as both politically neutral and adopts a norm-based approach that has no point of reference outside of itself.

This idea of culture can be extended to the idea of intellectual practices such as openness. For example, the difference between the culture of higher education and the culture of business can be demonstrated through their contrasting approaches to the knowledge that is generated through their activities. The culture of higher education is broadly to share that knowledge. Research is presented to academic conferences or published in academic journals where its intentions, methods and outcomes can be scrutinised. It is considered reasonable for other people to extend or repeat that research. Indeed, it is encouraged as a means of testing its validity and reliability. The culture of business is broadly to guard knowledge. It is potentially worth less if others can access it; stakeholder’s interests are not best served by giving away knowledge for others to commercially exploit. A simple analysis might suggest that businesses – even those described as communities (Handy, 1992) - exist to benefit their shareholders and higher education exists for the benefit of the public. It may, however, be unfair to characterise all businesses as self-serving. For example, social enterprises operate as business with ‘primarily social objectives whose surpluses are principally reinvested for that purpose in the business or in the community, rather than being driven by the need to maximise profit for shareholders and owners’ (UK Department for Trade and Industry, as quoted by Bull, 2008, p. 270). It may also be unfair to characterise universities as wholly public institutions. This idea is a critical one to explore as part of this thesis.

To understand the ‘publicness’ of higher education it is necessary to make a distinction between the related terms of *public good, public impact* and *public purpose*. The concept of public good has a precise meaning in economic theory. Samuelson defines it in two ways. Firstly, is it ‘non-rivalrous’, so that one person’s use cannot exhaust it for others. Secondly, is that it is ‘non-excludable’ so that

individuals cannot be denied access to it (Samuelson, 1954). This means that people are not in competition to use a public good and can benefit in common. For example, I can navigate my way home using streetlighting without fear that I am denying someone else the same privilege. Equally, the knowledge generated and shared through university activities could be considered a ‘pure’ public good, although there are arguments that the current model of academic publishing negates this by making academic research visible only to academic researchers (Grant, 2021, p. 24). An open access movement has recently attempted to address this through developing wholly open access academic journals and placing pressure on academic publishers to publish a greater proportion of submitted research (Gershenson et al., 2020).

Public impact is defined broadly as activities that achieve a benefit to the public. For example, in reference to research impact, the UK Economic and Social Research Council (ESRC) defines impact as ‘the demonstrable contribution that excellent [research] has on society and the economy, and its benefits to individuals, organisations or nations’ (ESRC, 2021). There is evidence that this is something that universities are concerned about. For example, a recent study found that 42 of the world’s 71 top universities - as defined by the 2018 THE World University Rankings - included reference to social responsibility in their founding or current mission statements (Grant, 2021). A number of those universities now place social responsibility as a central mission alongside teaching and research (Watson et al., 2011). This may represent a significant shift in how universities regard themselves. Equally, it might be more akin to the philanthropic notions of ‘corporate social responsibility’ common in the commercial sector when a business seeks to ‘enhance the social well-being of those whose lives are affected by the firm’s economic operations’ (Frederick, 2018, p. 4) as long as they promote – or at least do not threaten - the profit-motive.

UK Governments have long expected its universities to have a public impact, as evidenced by independent reviews of UK higher education since the 1960s. These reviews provide an indication of how prevailing views about the social responsibilities of higher education have evolved. The 1963 Robbins report discusses the contribution that universities make towards the ‘transmission of a common culture and common standards of citizenship’ within and beyond national boundaries (Robbins, 1963, p. 5). It concludes that the ‘influence and authority of those who

have become acknowledged experts in their own fields of study radiate out far beyond the walls of the university in which they teach' (Robbins, 1963, p. 170). The report identifies the first objective of higher education as the 'instruction in skills suitable to play a part in the general division of labour' (Robbins, 1963, p. 5). This objective was listed first because it was a sentiment that was felt to be 'ignored or undervalued' (Robbins, 1963, p. 5). This appears less of a problem by the time that the Dearing (1997), Browne (2010) or Augar (2019) reports were published, all of which clearly locate economic development as one of the key responsibilities of higher education, alongside more nebulous ideas of sustaining a society that is inclusive, democratic and 'civil'. Where these reports reference social responsibilities more broadly, they tend to do so in the context of local or regional development. For example, the Augar report defines one of the purposes of a post-18 education as playing 'a core civic role in the regeneration, culture, sustainability, and heritage of the communities in which they are based' (Augar, 2019, p. 17).

Perhaps it is not surprising that reviews of higher education that are commissioned by national governments focus on national issues. Many higher education institutions take a more global perspective, perhaps reflecting the international nature of its staff and students. For example, the University of Birmingham defines its strategy in terms of its 'global reach' and promises to 'bring together the people and resources to tackle the major challenges of our time' (University of Birmingham, 2015). Similarly, the University of East Anglia's strategy sets out to address global challenges, and to remember that 'staff, students and partners all have their own powerful motivations, often aligned to making a big impact on world problems' (The University of East Anglia, 2016). These ambitions mirror that of the 1998 UNESCO declaration on higher education for the twenty-first century, which urged higher education institutions to 'educate students to become well informed and deeply motivated citizens, who can think critically, analyse problems of society, look for solutions to the problems of society, apply them and accept social responsibilities' (UNESCO, 1998, p. 6). It further calls on higher education institutions to 'use their autonomy and high academic standards to contribute to the sustainable development of society and to the resolution of the issues facing the society of the future' (UNESCO, 1998).

In contrast, the concept of public purpose refers to the deliberate steps taken to contribute towards the common good. It encompasses decisions and strategies that

are designed to create ‘public value’ (UCL IIPP, 2017). As such, institutions seeking to demonstrate public purpose ask questions such as ‘what are we intending to do?’ and ‘why are we doing it?’. Institutions seeking to demonstrate public impact ask questions such as ‘who benefits from this?’ and ‘how do they benefit from it?’. In some ways, these questions are entangled, but the difference in emphasis between intentions and outcomes is a fundamental one. Within a public purpose model, higher education institutions can set the terms for their public role. Grant argues that many universities have always had this as a central mission, dating back to the 19th century foundation of the ‘redbrick’ universities in the UK (Grant, 2021).This provides them with the academic freedom to pursue their own agendas. In doing so, they can reject the binary distinction between knowledge generated to satisfy curiosity and knowledge generated to order. Research inspired by the promise of progress may lead to poor outcomes, in the same way that research inspired by curiosity may lead to profound outcomes. For example, the research team responsible for discovering graphene, a revolutionary one atom thick material that has applications across the fields of electronics, biomedicine, engineering and design (Geim & Novoselov, 2007), did so as part of a series of ‘Friday Night Experiments’ that included an attempt to levitate a frog (Berry & Geim, 1997). The method of enquiry is the same, even if the significance of the outcomes is very different. This model of ‘accidental’ success has echoes of the concept of flying in Douglas Adam’s Hitch Hiker’s Guide to the Galaxy series of novels, where characters can only succeed in learning how to ‘throw yourself at the ground and miss’ if they are no longer thinking about falling (Adams, 1994, p. 359).

The commitment and capacity of universities to translate ‘good’ intentions into meaningful actions has been called into question. Authors such as Readings and Marginson have described universities as ‘ruined’ institutions (Readings, 1996) that ‘stand for nothing more, nothing deeper, or more collective, no greater public good, than the aggregation of self-interest’ (Marginson, 2011). These arguments present universities as disconnected from their founding principles. Without these deep roots anchoring them in place they become vulnerable to the threats posed by a hostile external environment. In his analysis, Marginson draws parallels between modern higher education institutions and English monasteries prior to their dissolution in the

16th century, noting that it took only ten years for the Crown to suppress and seize the wealth of hundreds of monastic establishments that had endured for centuries.

Universities have been criticised for colluding in this process. These criticisms generally take two forms. The first relates to a failure to demonstrate solidarity. Individual higher education institutions are said to be self-serving, allowing themselves to become dominated by government through division and disaggregation. Watson argues that they have allowed 'important elements of history [and] values to become…the subject of short-term (and understandably uninformed) political adjudication' (Watson, 2006, p. 6). Marginson attributes this inaction to an endemic status competition that sees individual institutions prize their own interests above their collective interests. As such, higher education institutions defer to government on public policy in order to concentrate their efforts on enhancing their own reputations in public league tables that rate and rank performance. In doing so, they have failed to challenge the 'sheer volume of ignorance, misunderstanding and hostility which marks so much public and political comment on universities at present' (Collini, 2012, p. 115).

This status competition can also manifest at an individual level and with the active consent of participants. Fitzpatrick argues that colleagues become threats to each other because reward systems emphasise individual achievement over collective effort. Within these rivalrous relationships knowledge is power, ignorance is shameful and curiosity is punished (Fitzpatrick, 2019). She writes that 'our internalized senses of competition can cause us to interpret [questions] as aggressive and to respond with shame' (Fitzpatrick, 2019, p. 47). Foucault describes this form of positive self-regulation as governmentality (Foucault, 2008). Fitzpatrick advocates for an approach she titles 'Generous Thinking', where individuals 'work towards a shared understanding that is something more than we can bear alone' (Fitzpatrick, 2019, p. 55). This involves promoting within universities the practice of engaging and exploring the ideas of others in good faith and discouraging those seeking to discredit others to demonstrate the superiority of our own thinking.

Another key criticism of the public purpose model is the extent to which universities are prepared to turn their gaze inwards. Without the level of resources available to national governments or private corporations, the role of universities in bringing about positive social change has been focused on providing solutions to other people's

problems rather than their own. Grant argues that this is because universities have entrenched views about their position in the world (2021). He describes these universities as exercising an ‘Old Power’ that is based on authority drawn from disciplinary expertise. This expertise becomes an end in itself, so that universities value the professional status that it confers over its capacity to bring about transformation. He echoes Marginson in arguing that universities risk becoming self-serving, only speaking out when their own interests are threatened. He leans on the work of Timms and Heimans (2019) in stating that we are currently living through ‘inbetween times’ where there is a growing tension between the Old Power values of universities and the ‘New Power’ values of students who expect to be able to understand and shape the world more directly through networked forms of engagement. He makes the case for universities embracing these New Power values by committing to advocate for and deliver social change, adopting more open governance structures, and abandoning claims to special status. He imagines a New Power University where junior academic staff are provided with more security than senior colleagues, where ‘third space’ professionals predominate and where universities are fully embedded within their local communities.

This section of my literature review has argued that expectations of the public role of higher education depend on the approach taken to demonstrating ‘publicness’. Within a public good model, universities must provide benefits that are both non-rivalrous and non-excludable. As such, teaching could not be considered a public good because it is only available to those with the academic ability, time and financial means necessary to access it. Within a public purpose model, universities set the terms for their own sense of publicness. They decide what they want to do and how it is measured. Critics such as Readings and Marginson argue that universities are not currently best placed to make those decisions because they are self-serving; they will prioritise their own interests over those of others. Indeed, they are many commentaries that suggest that universities are actively doing harm within their communities. These criticisms range from a failure to widen access to students from disadvantaged backgrounds (Robinson & Salvestrini, 2020), to accepting donations from controversial donors (Rendon, 2020) or pricing local communities out of the housing market (Hyatt, 2017). For example, Brin Hyatt writes that the ‘voracious need for land in order to modernise science labs, libraries, residence halls, gyms and other

facilities [is] displacing more modest working-class communities and their residents' (Hyatt, 2017, p. 56). In part, this may explain why universities are often held to account through a public impact model. This will be the focus of the following section.

The avalanche is coming: the impact and accountability of higher education

Understanding how Grand Challenges attempt to manage the tensions between competing conceptions of publicness will form a major piece of this thesis project. Within a public impact model, higher education institutions are required to evidence success. Crucially, the criteria for success are generally defined by others. While this may prevent universities from becoming self-serving, McCowan also discusses the perils of this agenda (2018). First among them is the question of values. He argues that impact is not neutral, and that what we individually or collectively think of as important shapes how we define success. For example, the lack of action on the climate crisis could in part be explained by the reluctance of those who benefit from the status quo to accept changes that would threaten their position. McCowan also outlines perils that relate to the difficulties in demonstrating impact. This includes the challenge of establishing causation within complex systems, of embracing risk-taking with uncertain outcomes and the difficulty in finding measures for often abstract goals. Within this model knowledge is no longer an end sufficient to rest in. This leads to the oxymoronic situation in which experimentation is only encouraged as long as it guarantees progress. McCowan argues that this process can distort our priorities, so that we value only which that we can measure. As Cameron states 'in education, not everything that counts can be counted and not everything that can be counted counts' (Cameron, 1963, p. 13).

As an example, in 2017 the UK Government developed a *Teaching Excellence Framework* (TEF) that attempted to measure the quality of teaching in UK universities, with the expressed aim of 'incentivising excellent teaching and giving all students better information on where the best provision is found' (BIS, 2016, pp. 9–10). In the absence of a common understanding of what defines excellence in teaching the TEF used a series of proxy measures to rate institutions as gold, silver or bronze providers. These included quantitative measures relating to student entry, progression, satisfaction and graduate outcomes, as well as qualitative 'narrative statements' offered by institutions to contextualise their quantitative data. The use of

proxy measures in the TEF raises questions about the validity of the exercise. For example, including graduate outcomes implies that there is a necessary relationship between the quality of teaching and the likelihood of graduates enjoying career success. It may not be reasonable to hold universities wholly responsible for the overall market for graduates, which is shaped by a range of economic and social factors outside of their control. Equally, this offers a reductive definition of career success that prioritises graduate earnings over fulfilment, thereby disregarding those whose principal motivation is not financial, such as those choosing not to work, to work for themselves or in low-paid industries.

Supporters have heralded the TEF as helping to 'driving up positive outcomes for all students' by demonstrating 'the value that students get from their education' (Husbands, 2016). This market-driven approach to higher education has been enthusiastically championed by a number of agencies. For example, in 2013 an Institute for Public Policy Research (IPPR) report warned that unless 'deep, radical and urgent transformation' (Barber et al., 2013, p. 5) takes place an avalanche would come to sweep across the higher education sector. The twin forces of marketisation and globalisation would 'fundamentally alter the landscape for universities' (Barber et al., 2013, p. 67). Throughout the report the message is clear: universities need to recognise that the 'new student consumer is king' (Barber et al., 2013, p. 6). The report's co-author - Sir Michael Barber - later became the first Chair of the Office for Students, the body tasked with regulation of higher education in England (UK Parliament, 2017).

Critics of these policies argue that this desire for accountability forms part of a larger project to 'capture' higher education by 'economic arguments and neoliberal policy' (Boni & Walker, 2013, p. 15). From this perspective the introduction of market values into higher education functions as a disciplinary technology that commodifies teaching and research (Barnett, 1999) and embeds subtle forms of governance that lead to citizens policing their own behaviour (Davis, 2017). Morrish describes the TEF as 'a calculated plan to render universities, staff and students as neoliberal subjects' through the inculcation of market values and priorities (Morrish, 2019, p. 355).

In his analysis of Irish education, Stephen Ball describes neoliberalism as the 'slouching beast' that undermines teachers by subjecting them to 'technologies' that

reshape their professional identity (Ball, 2016). He borrows Shamir's definition of neoliberalism as a 'complex, often incoherent and even contradictory set of practices that are organised around a certain imagination of the 'market' as a basis for the universalization of social relations' (Shamir, 2008). He identifies three key technologies: the market, management and performance. The market refers to two related forms of privatisation, one that involves introducing internal competition to the sector – described as *endogenous* privatisation – and one that encourages new providers into the sector – described as *exogenous* privatisation. Ball argues that these twin processes combine to shift education from a public good to a private one.

Ball's second technology of 'management' focuses on how change is enacted through the system of education. He describes this as an iterative process of reform, where a succession of small changes lead to profound shifts in the way that we regard our roles and relations to each other. As such, it is analogous to the 'boiling frog' fable where a frog in a pan of water will not escape if the temperature is raised in increments. Ball argues that these reforms are presented as a series of opportunities to drive innovation, enhancement and excellence, but only succeed in reconceptualising professionalism away from principles and judgement and towards skill and competences. One example of such a process is described as 'unbundling' where curated programmes of study are broken up into discrete chunks of individualised content that can be studied in isolation (McCowan, 2017). This is presented as enabling student choice, but also threatens to undermines individual or institutional attempts to establish a coherent curriculum design and distances learners from peers and structures of support. McCowan argues that the logical outcome of this disaggregation is the conclusion that 'we cannot meaningfully speak of a university at all' (McCowan, 2017, p. 11).

These changes to the nature of professionalism are made possible by Ball's third technology of performativity, which is defined as the 'complex and powerful relationships between [performance] indicators and management systems and teacher identity and professionalism' (Ball, 2016, p. 1052). Within these relationships, individuals and institutions compete to demonstrate their worth through their measurable outputs such as student progression, attainment and satisfaction. In this system, performance is relative so that 'last year's efforts are a benchmark for this year's improvement' (Ball, 2016, p. 1054). This argument echoes that of Foucault in

asserting that individuals become inculcated within self-regulating performance cultures that offer both reward and punishment (Foucault, 2008). In doing so, they undergo a process of 'ethical retooling' where they lose sight of their own sense of self-worth or meaning. This is also described as a form of 'ontological insecurity'.

This performativity also applies at an institutional level. Reforms that seek to make individuals and institutions accountable function more as an exercise in disruption that are designed to promote market values, to undermine public confidence in higher education, and to subvert the concept of professionalism. Hanlon describes this 'struggle for the soul of professionalism' as being one that is centred around the issue of trust (Hanlon, 1998). This is a crucial issue, although there is little consensus about the theoretical foundations and precise definition of the concept of 'public trust' in relation to public sector institutions (Gille et al., 2017). While there is little evidence that the public has, in the words of the UK's former Justice Secretary, 'had enough of experts' (Mance, 2016; Dommett & Pearce, 2019) higher education does not appear to enjoy a comparable sense of intrinsic worth as the UK's National Health Service, which continues to be free at the point of delivery because of substantial public funding and support. Equally, the idea that any professional role deserves implicit trust may have been challenged by high profile cases where self-regulation has conspicuously failed, such as the recent College admission bribery case (Kates, 2019).

The use of these performance indicators now extends beyond national boundaries. Marginson argues that universities throughout the world have become caught in a status-incentive trap brought on by the advent of global ranking exercises such as the *US News and World Report* (2011). This has two key consequences. Firstly, by placing diverse universities on a single vertical scale it taps into an endemic status competition that encourages universities to see each other as competitors rather than collaborators. Secondly, by ranking institutions according to a narrow set of criteria that inflate the value of existing status it serves to 'confirm the dominance of the comprehensive Anglo-American science university' (Marginson, 2011, p. 429). In doing so, it helps to distort the core business of a university. Writing from a South African context, Swartz et al. argue that university 'decision-makers are juggling multiple objectives which are not just contradictory in their logic, but also have quite divergent effects and impacts on the public higher education system' (2018). They

describe how universities are stuck ‘between a rock and hard place’, unsure whether to pursue rankings, research funding, external partnerships, student recruitment, student satisfaction or development income, and failing to balance the tensions between appearing globally competitive and ‘meeting the ever-widening plethora of needs of students, staff, and the broader community in a highly stratified society’ (2018).

The accountability agenda has been accompanied by another equally significant movement. The ‘contracting out’ of higher education enables government to reposition itself as a regulator rather than a funder or service provider. In doing so, responsibility is shifted to individual institutions, which are expected to demonstrate ‘value for money’ (McVitty, 2019). Prospective students are encouraged to ‘shop around’ between different higher education providers (Competitions & Market Authority, 2015, p. 11) and seek compensation through consumer protection law if their expectations are not met. This promotion of students as powerful individual consumers of education has the potential to create dissonance, encouraging students to seek mutually exclusive goals. Tuchman presents a caricature of students caught in this impossible dilemma:

> They want both social acceptance and private goods. They want to get through their coursework; they want jobs that pay well, but not the solitary learning necessary to stretch the mind. They want to have fun. They want to be recognized as individuals. They stand at the campus bus stops, cell phone glued to ear, stance announcing that they have a friend to talk with and so are not alone (Tuchman, 2011, p. 219).

It is not clear whether Tuchman’s description is a fair representation of student expectations. Irrespective, by encouraging students to see themselves as consumers of education and universities as providers of education, learning becomes transactional; the product of a financial commitment rather than an intellectual one. This shift of responsibility from the student to the institution has consequences both for the student, who is encouraged to adopt instrumental approaches to their learning, and for the relationship between student and institution. The idea of the singular ‘student voice’ becomes pervasive, with institutions developing simplistic ‘you said, we did’ style campaigns that cherry pick specific student concerns expressed through surveys and then present them back as solved. The alternative

approach is to recognise that responding to feedback is a process, and to enter into dialogue with a multiplicity of different perspectives and interests. As Stephen Lukes argues, some of the most profound expressions of power are those that are exercised through non-decision making or through an ideological impulse that encourages people to want things that are not in their self-interest (Lukes, 1974). He describes these, respectively, as the second and third 'faces of power'.

As a consequence, higher education institutions have arguably become trapped between two very different models of governance. One where self-governing scholars advance knowledge through scholarship and teaching (Collini, 2012), and another in which universities are brought directly under state control (Tapper, 2015). The university has been described as the 'only European institution to have preserved its fundamental patterns and basic social role and function over the course of the last millennium' (Rüegg, 2003, p. ii). Indeed, Elton argues that the 'history of universities has shown again and again that universities are capable of resisting external pressures for quite long periods of time without apparent damage to themselves' (Elton, 1981, p. 27). He also adds that this is 'possibly not without damage to the societies in which they exist' (Elton, 1981, p. 27). In contrast, Watson argues that recent reforms of higher education – described as the 'quality wars' – have significantly eroded institutional autonomy and called into question the extent to which UK higher education can now claim to be self-governing (Watson, 2006). Talbot argues that the pendulum in UK policy tends to swing between the two extremes, concerned at one point about tightly regulating public services to avoid 'producer capture' and at another about liberating public services from governmental control (2021). In doing so, he borrows from Le Grand (2006) in arguing that both extremes make assumptions about the motivations of public sector workers; presenting them either as knaves acting in self-interest or as selfless knights acting in the public interest. Talbot argues that both knave or knight narratives are false, and that the solution is to 'recognise the inherent contradictions and create sensible systems of checks and balances' (2021).

The issue of the accountability of higher education is a crucial one in understanding the public role of universities. What is potentially lost within a wholly accountability-based system is the extent to which universities should be free to challenge those that they are accountable to. There are those who do not see the tension between

serving the immediate needs of policy-makers and in looking a longer-term view. For example, government sponsored reports on Higher Education such as the Dearing Report talk of universities bettering the economy and society as if they are synonymous (Dearing, 1997).

Champions of critical pedagogies, such as Paulo Freire, argue that any attempt to promote social and economic betterment without acknowledgement of the inequalities of prevailing social, economic and political paradigms becomes itself irresponsible (Freire, 1970). He also discussed the importance of engaging directly with those affected, and not attempting to solve problems on their behalf, as 'attempting to liberate the oppressed without their reflective participation in the act of liberation is to treat them as objects that must be saved from a burning building' (Freire, 1970, p. 65). Similarly, in her defence of the humanities and the arts, Martha Nussbaum states that they serve to 'make a world that is worth living in, and democracies that are able to overcome fear and suspicion and to generate vital space for sympathetic and reasoned debate' (Nussbaum, 2009, p. 15). Nussbaum borrows the Aristotelian concept of practical reasoning to argue that it is the responsibility of higher education to help people 'choose well' (Nussbaum, 1990). This involves helping students to develop the 'capabilities' to reach informed judgements about complex moral challenges where there are no obvious actions or measurable outcomes. Walker identifies the parallels between this and Barnett's concept of 'an ontological turn' (Barnett, 2005), as well as Marquez's call to dissolve the boundaries between being and becoming so that 'our students learn to become agents in their own lives and society, not mere spectators or, worse, 'strategic objects' in the economy' (Marquez, 2006, p. 160). Unterhalter and Carpentier argue that this is more than a contest between the opposing forces of regulation and democracy (Unterhalter and Carpentier, 2010). They present it as a 'tetralemma' where the forces of sustainability, economic growth, equity, democracy and sustainability are all in tension. Boni and Walker describe these forces as 'all pulling higher education in different directions so that resolving one dimension means compromising or abandoning at least one other' (Boni and Walker, 2013, p. 16).

This thesis attempts to understand how the forces described in this literature review contribute towards the emergence of Grand Challenges in UK higher education. In turn it also explores the forces that Grand Challenges can themselves generate. To

this end I have developed three sub-questions that extend my initial research question, which was ‘how does the emergence of Grand Challenges inform the debate about the public role of UK higher education?’. These questions are:

- Why have Grand Challenges emerged in UK higher education?
- Who are higher education-based Grand Challenges for?
- How should higher education-based Grand Challenges be designed?

Chapter 2: Methodology

This methodology section outlines how I addressed my research questions. This includes a discussion of the theoretical framework that informs my approach to research, a rationale for and description of the research methods employed, and a discussion of research ethics.

Before doing so, it is important to situate myself within my research project. This involves both an awareness that ‘social science researchers are entangled in networks and relationships, and the co-creation of the social world they aim to study’ (Benson & O’Reilly, 2022, p. 179) and a commitment to reflexive practice as a dynamic process of reflection and action (O’Reilly, 2012). I was able to secure access to the postgraduate Grand Challenge that forms the heart of this research through longstanding relationships with those responsible for devising, designing and delivering it. I played no part in this process. In a former role, however, I was responsible for helping to create the institutional academic framework that enabled school-wide units such as this to be developed. I also remain in contact with many of the people that I interviewed and observed, including some who were introduced to me through this research project. They continue to be a valuable resource to me as I develop my own practice, as I hope to be for them.

The research process has been transformative for me. It has enabled me to reflect on why I work in higher education, and provided me with the intellectual framework to engage with my professional practice as a teacher, a student, a manager and a colleague. It has proven particularly useful in helping me respond creatively to the challenges of living, working and studying through the Covid-19 pandemic. I was part of an institutional effort to remotely maintain the functions of a university while its community were sitting on bedroom floors, in garden sheds and around kitchen tables. We hastily made policies on how students could be taught and assessed online, on how they could be supported to take and return from leaves of absence, on how we could ensure that there was ‘no detriment’ to students while maintaining academic standards. It was our own ‘wicked problem’, and as with all wicked problems there were no right answers. Individual stories have stayed with me: the distraught student whose work is accidentally damaged as the studio spaces are cleared in readiness for a deep clean; the graduate who cannot complete their final project because it requires access to technical facilities that have long since been

closed down; the colleague who is continuing to work as their partner lies ill in the next room. It was, and continues to be, a difficult time.

Theoretical Framework

This thesis project employed a theoretical framework called critical realism, which was first developed by Roy Bhasker (1979). Critical realism rejects the 'epistemic fallacy' that there is no distinction between ontology and epistemology (Bhaskar, 1998). As such, a critical realist would argue that the world exists independently of our knowledge of it. The task of the critical realist researcher is to establish causation by identifying the powers that natural or social objects possess. This involves asking 'what makes it happen, what 'produces', 'generates', 'creates' or 'determines' it or, more weakly, what enables' or 'leads to it'' (Sayer, 2000, p. 104). This is achieved through an exploration of three domains of knowledge.

The *empirical domain* is the domain of lived experience. This involves a researcher investigating what individuals think, feel and remember, usually through qualitative research methods. For example, in a previous research project I interviewed people as part of an investigation into the equitability of group discussions. Before those interviews, I had assumed that everyone had wanted to contribute to those discussions, which was not the case. For a critical realist understanding individual experience is an important step in establishing why things happen. It is only the first step; memory is fallible, interpretations differ, and structures may be hidden to those involved.

The *actual domain* is the domain of events. This involves a researcher observing behaviour, actions and outcomes in order to identify external effects. This process enables the researcher to contrast perceptions with events, which the critical realist argues are different things. This may involve a consideration of where expected outcomes are not observed. As Easton argues, 'the non-occurrence of an event…may also provide useful insights' (2010, p. 120). For example, in my previous research I conducted structured observations that mapped the distribution of turns in the group discussions. This enabled me to highlight differences between perceptions and outcomes, such as the examples when individuals over- or under-estimated their levels of involvement in those discussions.

The *real domain* is the domain of mechanisms. For a critical realist there is a living ecosystem of structures that shape our social world. These structures - described as mechanisms - have tendencies that generate certain effects. The extent to which each mechanism can generate effects will depend on how it interacts with other mechanisms that emerge within this open and dynamic system. These forces are often hidden to us ‘rather as the ‘workings of a clock cannot be seen but drive the patterned movements of the hands.’ (Pawson & Tilley, 2004, p. 6) so that we may witness the effects without knowing the cause. For example, in my earlier research an individual may explain their reluctance to contribute to group discussions in personal terms (“I wasn’t feeling in the mood today”) rather than relate it to broader patterns of inequality or underrepresentation.

The task of the critical realist researcher is to investigate the empirical and actual domains in order to identify the generating mechanisms in the real domain. In essence, this means asking the retroductive question ‘what would need to be true in order for this to be possible?’ This idea that there is a higher truth to be found is often considered problematic. As Carrithers et al. states ‘our common world is one of irreducible heterogeneity, not of homogeneous and totalitarian certainty’ (2010, p. 160). The truths of a critical realist are, however, not akin to the Platonic theory of Forms, which posits the existence of a place of idealised and unchanging objects (Plato, 1966). For a critical realist, the truth is not assumed to be a universal one. Such a thing is not possible within an open system that is subject to change. Similarly, the failure of a mechanism to exercise its powers is not sufficient to refute its existence. There may be countervailing mechanisms that suppress the expression of those powers. This might suggest that there is little to distinguish a critical realist perspective from an interpretivist one that assumes multiple realities. The key difference is that a critical realist would argue that knowledge can be counter-phenomenal, and can liberate us from ‘enslaving appearances’ (Collier, 1994, p. 15) by challenging and transforming existing practices rather than rationalising them.

In this project, I chose to use critical realism both because it reflects my own philosophical position – i.e. that there are structures that exist beyond individual experience - and because it provides a useful theoretical framework to approach my research. This framing is more conceptual rather than practical; critical realism does not dictate the research methods used, nor the order in which they are deployed. It

does, however, require a researcher to investigate ‘social phenomena by recording and analysing the associated events that take place as a result of the actors acting’ (Easton, 2010, p. 123). It is this focus on action that distinguishes it from more interpretivist traditions that ‘fails to account for false consciousness and mistaken beliefs, and problematically conflates everyday experience with robust, theoretical explanations (Lennox & Jurdi-Hage, 2017, p. 36). For example, Lennox and Jurd-Hage’s own research into street harassment sought to identify the underlying systems that normalised behaviours rather than profile individual acts of harassment (Lennox & Jurdi-Hage, 2017).

In this way, critical realism acts as a meta-theory that can both co-exist alongside other theories and mediate between them. In the context of my own literature review, it is not necessary for Marginson’s theory of status competition to be false for Bell’s conceptualisation of neoliberalism to be true. Both could function as generating mechanisms within the wider ecosystem of powerful structures. Fletcher describes these as ‘initial theories’ and argues they facilitate ‘a deeper analysis that can…help build a new and more accurate explanation of reality’ (Fletcher, 2017, p. 184). She also advises against either rejecting or committing to these initial theories in the design phase of research. It is the purpose of the research project to ‘support, elaborate or deny’ existing explanations of causality (Fletcher, 2017, p. 184).

A critical realist researcher must ensure that they investigate both the empirical and actual domains through the use of research methods that encompass experiences and events. As such, critical realists often used mixed method – or multi-strategy – approaches to research design, as I have done for this thesis project.

Research Methods

My research involved two principal methods of research: interviews and digital ethnography. I conducted six interviews with key staff responsible for initiating, designing and delivering an institutional Grand Challenge, as well as digital ethnography of one Grand Challenge based in a postgraduate higher education institution. This institution will be pseudonymously referred to as the National College of Creativity (NCC). The interviews were an opportunity to explore the empirical domain of those responsible for designing, delivering and evaluating the Grand Challenges. I chose interviews because they enabled me to enter into a dialogue with interviewees which promised to generate rich data. This meant that I was able to

modify my ‘line of enquiry’ (Robson, 2016, p. 286) in response to the answers given. It provided an opportunity for both me and the interviewee to ask clarifying questions if something was not understood. It also minimised the likelihood of peer pressure or groupthink affecting a respondents’ answers, at the potential cost of a less dynamic discussion. Interviews can be an intensive research method. It can take many hours to prepare for, schedule, conduct, collate, and analyse each individual interview. As such, when decided how many interviews to conduct there is a trade-off between the anticipated benefits of conducting more interviews and the costs of doing so.

I also conducted an ethnographic study of those participating in third iteration of the Grand Challenge project at the NCC. This enabled me to investigate the *empirical* and *actual* domains through directly observing behaviours and outcomes. Ethnography is a form of participative research that places the researcher in the same social setting as the research subjects (Robson, 2016). As such, it involves ‘direct and sustained contact with human agents, within the context of their daily lives (and cultures)’ (O’Reilly, 2012, p. 3). While ethnographic methods can offer insight into individual and group behaviours, sustained engagement with research subjects can also raise concerns about over-identification, which is sometimes described as ‘going native’. As Muratovski states, it is important to maintain a critical position as ‘becoming a member of the group is not an ethnographic study’ (Muratovski, 2016).

I used a ‘step-in-step-out’ form of ethnographic research that involves intensive contact over a short period of time. This form of immersive research is often conducted by those who are familiar with the setting, as I was (Madden, 2017). This makes it easier to identify gatekeepers, gain access to the site, and establish a rapport with participants. Initially, I was invited to join on-campus teaching sessions throughout the Grand Challenge, where I could both observe and interact with Challenge participants. The Covid-19 pandemic, however, resulted in major changes to the design and delivery of the unit. As a result, I conducted digital ethnography instead. This involved research *through* the digital, rather than research *of* the digital. Therefore it ‘takes as its starting point the idea that digital media and technologies are art of the everyday and more spectacular words that people inhabit’ (Pink et al., 2016a, p. 7). However, as it involves ‘mediated contact’ between the research and the participants, my analysis needed to acknowledge how the use of digital media,

technologies and tools informs my reflections, which is addressed in my discussion section.

The principal ambition of the digital ethnography was to investigate the second and third of my research questions. As such, my focus in those session was on actions of the teachers and the outcomes of the student projects. I wanted to use the digital ethnography as an opportunity to explore potential differences between expressed intentions and actions. In doing so, I was researching practices rather than experiences, relationships or social worlds (Pink et al., 2016a). This encompasses a consideration of 'how human actions and habits are shaped and maintained over time and the ways in which these impact in the world' (Pink et al., 2016b). These habits can be unconscious ones that the participant may not be aware of.

Interviews

I conducted in-depth semi-structured interviews with five staff involved in a Grand Challenge project developed by one School in the NCC. This was a core taught unit for all students in that School that, according to the unit specification, enabled them to 'meet new people, expand their… network and stretch their thinking in new and unexpected ways' (NCC, 2020). My research encompassed four iterations of the project. I also conducted a further interview with another member of staff responsible for coordinating a Grand Challenge in an undergraduate institution.

For these interviews, I developed 15 open questions that invited interviewees to reflect on their motivation for getting involved, their understanding and experience of the Grand Challenge, and their perspectives on the public responsibilities of individuals and institutions within higher education. These were grouped under three headings of 'Setting the Scene', 'Experiencing the Grand Challenge' and 'The Public role of higher education'. These questions are included as Appendix 1. They served as a useful set of prompts for me throughout the interview. I did, however, feel free to pursue new lines of enquiry suggested by interviewee responses. This responsiveness is a key characteristic of semi-structured interviews.

My interviews were conducted online across a 15-month period using the video-conferencing software Zoom. I had originally intended to conduct the interviews in-person but the Covid-19 pandemic made this impossible. Conducting the interviews online proved both flexible and familiar; I found it easier to make connections with interviewees when I could hear and see them. Conversely it did rely on both parties

having strong Internet connections throughout, which was not always the case. All interviews were interrupted at some point by fluctuating connection speeds. In some cases, this meant the call temporarily failed. In others it meant that individual responses were slurred, stuttered or lost entirely. Videoconferencing can also filter out body language and intonation, making it more difficult to identify non-verbal cues. I used the automatic transcription software Otter.ai to generate notes from these interviews, which I then reviewed and revised to ensure accuracy.

The interviews varied in duration from 45 minutes to 75 minutes. At the NCC the interviews included the senior manager responsible for initiating the Grand Challenge, three senior academics responsible for leading or co-leading the Grand Challenge across four years and one postgraduate researcher responsible for tutoring several project teams. These interviewees were chosen because they were best placed to respond to my research questions on motivations and alignment. I made sure that I had senior representation across each of the iterations of the Grand Challenge that had run to that point, as well as interviewing one of the tutors that I had observed working with students to provide more of a 'ground-level' perspective. To provide contrast, I also took the opportunity to interview a member of staff at a Russell Group university who was responsible for project managing an extra-curricular Grand Challenge project for undergraduate students. Unfortunately, there was not the opportunity to conduct further interviews with staff involved in the undergraduate Grand Challenge as part of this thesis project. In future, I would be interested in extending my research to encompass more examples of Grand Challenges across UK higher education and beyond.

I have anonymised reference to these interviews in my results section by creating the following pseudonyms:

- **John** is a Senior Manager and a Professor at the NCC. He was responsible for initiating the Grand Challenge. He continues to nominate the Academic Lead(s) each year and lead discussions on the choice of theme.
- **Edith** is a Head of Programme and a Reader at the NCC. She co-led the third Grand Challenge.

- **Ginerva** is a Senior Tutor at the NCC and has been responsible for several previous interdisciplinary initiatives. She co-led the second Grand Challenge.
- **Marcus** is Head of Programme and a Professor at the NCC. He led the first and fourth Grand Challenges.
- **Ana** is a doctoral student at the NCC. She tutored on the fourth Grand Challenge.
- **Marta** is a Project Manager at the undergraduate institution. She has been helping to coordinate the extra-curricular Grand Challenge for several years.

I conducted qualitative content analysis on the research data from the interviews. This involved importing the transcripts into the analysis software NVivo and developing a bespoke coding scheme to identify key themes within the textual data, and individual responses that best illustrate those themes. The research data was then coded line-by-line against this framework. The purpose of this process is to 'systematically break down, categorize and describe the content of texts' (Boréus & Bergström, 2017, p. 24). To improve reliability, I used the *double-coding* method, where two sample interview transcripts were independently coded on two separate occasions a fortnight apart. This was designed to help identify and address inconsistencies in the way that I interpreted the data. I used my comparison of the two separate coding schemes to develop a third and final coding scheme, which I subsequently applied to all interview transcripts.

NVivo allows data to be viewed by code. From this category view I developed a hand-drawn Mind Map which visually presented the key themes. Mind mapping is a 'brainstorming technique that allows users to deconstruct complex topics by creating a graphical representation of constituent subtopics and related themes' (Kernan et al., 2018, p. 101). I found this approach useful in comparing and contrasting key arguments, and in identifying potential generating mechanisms within the research data.

Digital Ethnography

My step-in step-out digital ethnography was conducted between October 2020 and March 2021. It encompassed more than 20 hours of ethnography that I both conducted live and asynchronously, including the following:

- A launch event (3 hours)
- A Grand Challenge briefing (90 mins)
- Briefing events for participating students across the seven themes (approx. 90 minutes each)
- A briefing on research ethics (45 minutes)
- Tutorials with student teams in a selected theme (3 hours)
- Final review of student projects in a selected theme (3 hours)
- Analysis of materials posted on online collaboration boards, virtual learning environments and public-facing web pages.

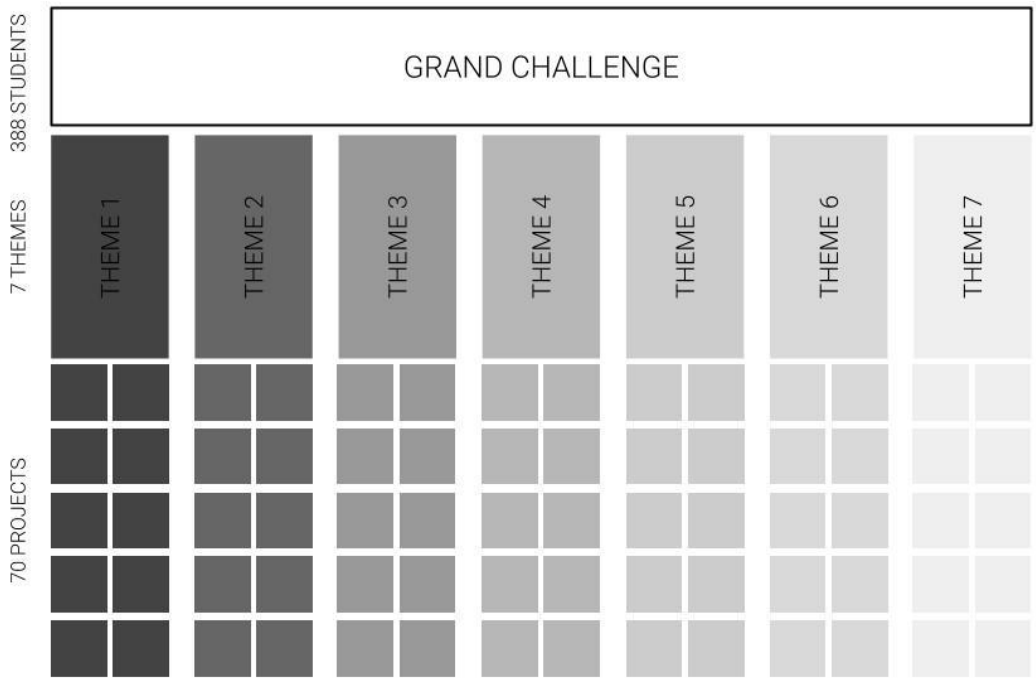

Figure 1: Grand Challenge Structure

This Grand Challenge was a mandatory 15-credit unit delivered wholly online to 388 postgraduate taught students across 8 academic programmes in 10 different time zones. The unit was led by four senior school staff and organised around a collaborative 'Design Sprint' method called the Double Diamond (DD). This approach

was developed by the Design Council to enable designers and non-designers to 'tackle some of the most complex social problems, economic and environmental problems' (Design Council, 2015). It is a four-step process that involves two phases of 'divergent thinking' – labelled as *Discover* and *Define* - where participants explore and define the challenge, and two phases of 'convergent thinking' – labelled *Develop* and *Deliver* – where participants develop and test potential solutions to that problem. Each of the four intensive weeks of the Grand Challenge were organised around a different aspect of the DD. The intensive weeks were preceded by a seven-week lecture series structured around the seven key themes of Care, Leadership, Health, Truth, Future, Next Generation Interaction & Resilience. In the first intensive week students were allocated to one of the seven themes. Within each theme, students were organised into interdisciplinary teams of usually four or five members. Project teams were also grouped by time zone to make collaboration easier. Each tutorial team was overseen by either a member of staff, a visiting lecturer or a research student who would meet with their students each week for thirty minutes. Teams were assessed weekly as a group. Students were told that they would be assessed both on the nature and on the outcomes of their collaboration.

All of the taught sessions were conducted using the Zoom conferencing software. All large-group teaching was archived on the VLE so I was able to access any session that I was unable to attend live. Large-group sessions involved introductory briefings about the Grand Challenge and individual themes, guest lectures, and development workshops on topics such as wicked problems, project-based learning, successful team working, creative leadership and ethics. Small-group teaching involved an interim group tutorial and a final review. The group tutorial involved each group meeting with their tutor for twenty-five minutes to present their initial idea and to discuss their progress. I joined a set of online tutorials in one of the seven themes. For each tutorial, I was introduced to the incoming student team, and was allowed to briefly explain the nature of my ethnographic research and how it involved them. To minimise the distraction of my presence I then turned off my camera and microphone for the rest of the tutorial. Student teams were allotted twenty-five minutes with their tutor. Each tutorial started with a presentation from the student team which summarised progress to date. The tutor then provided feedback to the team to help them plan next steps. Generally, students took it in turns to speak, each presenting a

different aspect of the proposed project. In the final review each of the ten teams present were given twenty minutes in total: ten minutes to present their project and ten minutes to answer questions posed by a panel of tutors.

The cumulative effect of critically engaging with such a volume of teaching, as well as the process of recording and reflecting on my responses to that teaching, was an intense process. After each session, I completed a detailed mind map which attempted to capture my immediate reflections. Insight was gained through an iterative process of making and abandoning connections between a maze of different questions, themes and ideas. I used this to develop a series of project types and imagined ‘indicative projects’ to help demonstrate the key differences between student projects. *These are not case studies of actual student projects*. I did not feel that it was reasonable or responsible to critique individual student projects when the focus of the Grand Challenge was on encouraging students to experiment without public scrutiny.

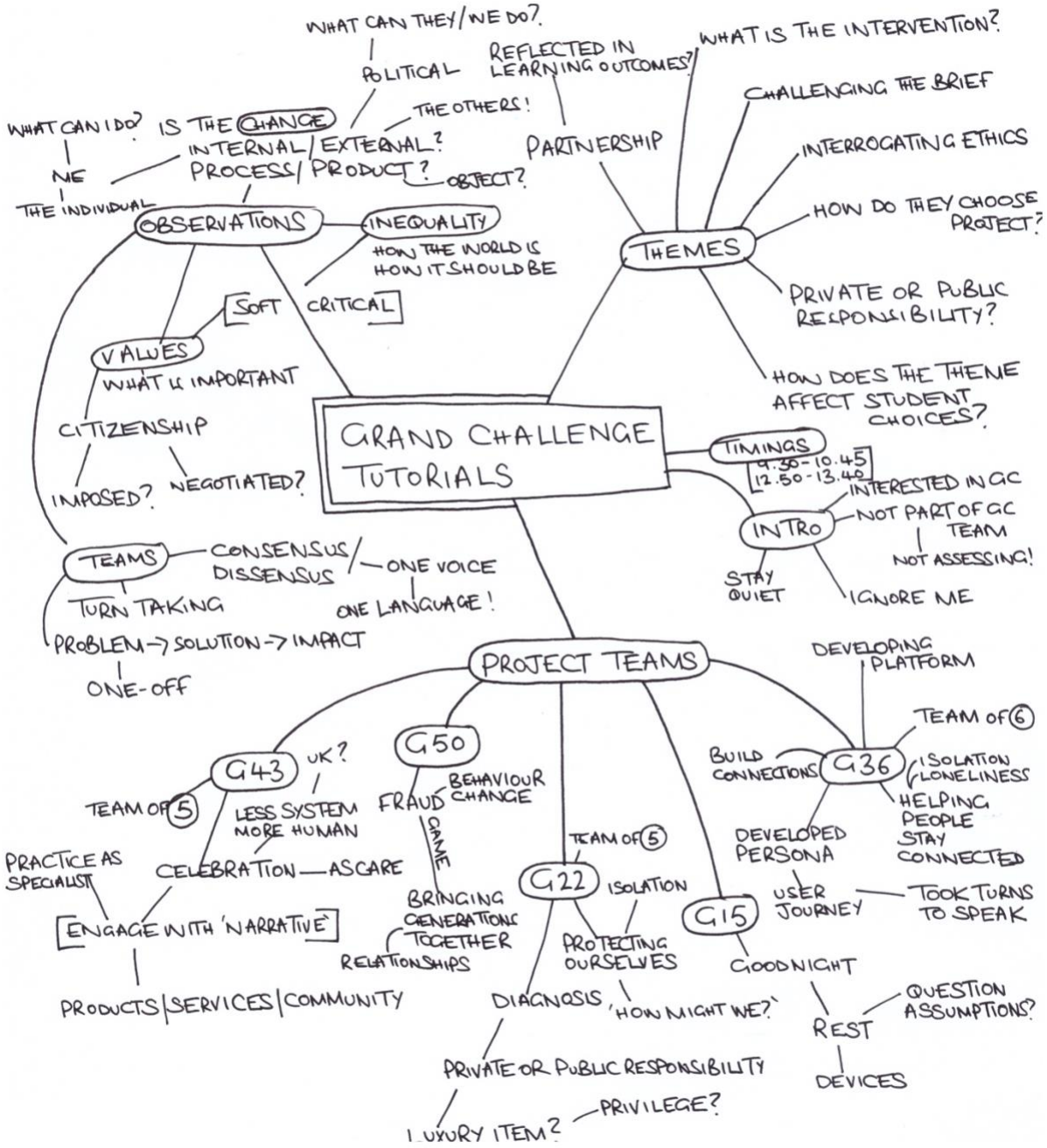

Figure 2: Ethnographic mind map example

Research Ethics

Ethical research should secure the informed consent of participants, and ensure that participation does not lead to harm. The prior connections that I had with some of those involved in my interviews and ethnography was one potential area of risk, with participants at a greater risk of being identified. This was discussed with interviewees, who were presented with an information sheet that described the nature of the research and explained how the research data would be collected, stored and used. This included a commitment to disguising the identity of

participating institutions and individual participants to help ensure anonymity. All interviewees completed consent forms, which confirmed that they had:

- read and understood the information sheet about this study;
- agreed to be interviewed as part of this study;
- agreed that the interview can be recorded;
- understood that if any of their words are used in reports or presentations, they would not be identified either by name or implication;
- understood that they could withdraw from the project at any time prior to publication, and that if they choose to do so, any data contributed would not be used.

As part of this responsibility, I also needed to ensure that any personal data collected was appropriately managed, and that participant confidentiality is maintained wherever possible. I secured ethical approval from UCL Institute of Education and the NCC prior to collecting any data. All interviews were both recorded on Zoom and on a phone using the Otter.ai software. All video and audio files from interviews, along with the accompanying transcripts were transferred onto an encrypted laptop or a cloud-based secure institutional drive. I committed to deleting all video and audio files at the conclusion of my research.

There was also a risk that my knowledge of the organisation and my existing relationships with the people responsible for initiating, designing and delivering the Grand Challenge would adversely affect those participating in my research. I had no stakes in the Grand Challenge outcomes, either in terms of the student assessment or the unit evaluation, nor have I ever worked in the same academic programme or professional services department as those interviewed or observed as part of my ethnography. Irrespective, to minimise the risk of participation, I made a commitment not to reference my research in any institutional discussions about the Grand Challenge.

Equally, my ethnographic research had the potential of being disruptive to students participating in the Grand Challenge either by changing their experience or by exposing them to ridicule and/or censure when the research become public. For example, it is possible that my attendance in live sessions could increase the

pressure on students presenting their ideas. To address this risk, all participating students in live sessions were briefed about my research and were informed that they could withdraw their consent at any time prior to publication. Once introduced, I turned off my video and muted my audio to help minimise my presence. No data was collected from those who withheld consent.

For the ethnographic research, I secured ethical approval from the NCC where the research was based. This involved securing the informed consent of key institution gatekeepers, which included the Senior Manager, the Academic Lead, and the Tutor facilitating the small-group sessions that I attended live.

Chapter 3: Results

This results section presents an analysis of my research data. It is organised into themes that draw on both the interviews and the digital ethnography that I conducted. In doing so, it investigates the empirical and actual domains in order to identify generating mechanisms within the real domain.

Designing disruption

One of my key areas of focus was the extent that the empirical domain of my interviewees aligned with the actual domain of the Grand Challenge sessions that I observed. I found that the Grand Challenge staff faced tremendous difficulties in translating their vision into the curriculum intact, particularly with regards to one of their principal ambitions: disruption. This was a common theme in the digital ethnography and in the interviews. Interviewees would often use words like ‘unsettle’, ‘destabilise’ or ‘shake’ to describe the ways in which Grand Challenge projects were aiming to take students out of their ‘comfort zone’ and into new uncertain territories. John (Senior Manager and Professor) discussed how difficult this process of disruption was, particularly for students who had come to rely on tried and tested approaches:

> People do come with preconceived ideas, and they make - as we all do as human beings - … assumptions quite quickly in order to make the next set of decisions (John).

Marcus (Head of Programme and Professor) felt that this approach had been shaped by students’ undergraduate experience, which trained them to become efficient about finding answers to questions that had already been solved. This ‘linear’ approach proved problematic when presented with complex challenges such as the climate crisis which hadn’t been solved and may not be resolvable:

> It's not a project. [It’s] multiple people's lives, overlapping. It's not something that starts and finishes in six months time. It's something which you keep having to work out (Marcus).

This has echoes of Morin’s conviction that students needed to have their beliefs and assumptions tested in order to ‘detect falsehoods’ (Morin, 2001). The Grand Challenge unit descriptor did not mention disruption. The learning outcomes related to a student’s ability to:

1) translate a systemic social, environmental or economic issue into a project brief
2) effectively use interdisciplinary methods to address the brief
3) develop a project proposal that is informed by research
4) develop approaches for exploring emerging issues
5) work effectively in interdisciplinary teams and
6) develop a 'proof-of-concept' that digitally or physically evidences the project.

In the documentation, the purpose of the Grand Challenge was described as creating a 'collaborative platform to tackle timely international [issues], providing the opportunity for creative…leadership in this area' (NCC, 2020). The emphasis in the unit descriptor was on the process over the product, with participating students expected to reflect on the strategies, approaches and methods that they employed. There was, however, a potential tension between the desire to disrupt students and the desire to support them to produce meaningful outputs. This was apparent from the initial launch events. In my digital ethnography, I observed ten scene-setting sessions for students that included an initial briefing, a launch event, themed panel sessions, and an introduction to ethics. The launch event was delivered online through the Zoom videoconferencing platform, and was hosted by the Senior Manager responsible for initiating the Grand Challenge as well as the key academics leading this iteration of it. The session was attended live by over half of the 388 student participants. A recording of the event was archived on the institution's Virtual Learning Environment (VLE). It provided an overview of the Grand Challenge. This included a presentation of the aims, outcomes, structures and the approach that participating students were encouraged to take to adopt as well as case studies from previous student projects. Students were informed by the Academic Lead that the purpose of the Grand Challenge was to:

- Meet new people from different disciplines
- Learn new disciplinary perspectives
- Learn new strategic and applied skills
- Tackle huge global issues

- Meet and learn from top world experts

The students were organised into one of seven themes, each of which had an academic Theme Leader. The Grand Challenge had a common set of learning outcomes, which were reviewed each year by the overall Academic Lead(s). It also had a common structure. Theme Leaders were responsible for curating theme launches, facilitating theme-based sessions and overseeing a team of academic tutors supporting individual project teams. The theme launches followed a common format, where a Theme Lead would introduce three international experts to present short 20-minute presentations that explored different aspects of that theme. These experts came from a range of roles, backgrounds and interests, from senior executives in major international corporations to charity workers from Non-Government Organisations (NGO). These presentations were described as 'provocations' that would offer up different perspectives on the chosen theme. The staff leading launch or briefing sessions were always hugely enthusiastic and encouraging. One commented that 'I hope you are as excited as we are'. Students were told by one Theme Leader that it was both an amazing opportunity, and that they should remember, above all things to 'enjoy it'. This unusual emphasis suggested to me that staff were, on some level, concerned about the motivation of students.

During the introductory sessions, staff were clear students had the creative freedom to interpret the brief as they wish and that the themes should only be the 'starting point' for their explorations. They were advised by one of the Theme Leads to take responsibility their own learning, and not to seek to meet the expectations of others. They were also told that 'it's about you' and that 'it's not about satisfying us'. At the conclusion of the unit, each project team was expected to present a project that addressed some aspect of their theme. Beyond that, no restrictions were made on student choices. They could choose what to focus on, how they work together, and what they present for assessment. This was not always the case. One former Academic Lead described how they initiated a 'Project Swap' process which involved each eight-person team exchanging their projects during the Challenge. The Academic Lead described the reaction to this announcement:

> [A] shocked silence rippled through the audience…[I thought] my head could be on a spike within the next five minutes (Edith, Head of Programme and Reader).

Project ideas were swapped during a ceremony mid-way through the Challenge. All teams were required to submit one idea, which was written on a piece of paper, folded and placed in a hat. Those projects were then redistributed randomly. The purpose of this was to encourage each project team 'to pay attention to everything that was being done':

> You didn't know which one you're going to pick up, you might be picking up a gem of an idea or you might be picking up a real pig…you had to make it work (Edith).

Beyond that, there was a more subversive ambition. Individual students were used to having ownership of their ideas. The conclusion of all postgraduate degrees in that institution was an 'Independent Research Project' where each student would individually plan, develop and present work that demonstrates their intellectual and technical ambitions. All iterations of the Grand Challenge in this institution involved students working together on team projects. This collaboration offered the possibility of sharing ideas, perspectives and experiences. It also had the potential of creating tension, competition and conflict. By going a step further and giving away that ownership and compelling teams to develop someone else's ideas the Academic Leads were hoping to encourage students to take a less ego-driven approach and engage with a more open form of creative exploration. This collective approach was daring, although denying project teams ownership of their own ideas might have adversely affected their motivation. It was also arguably also at odds with the broader Grand Challenge ethos that tended to celebrate project outcomes and those responsible for them. It was not repeated in later iterations.

In the Grand Challenge I observed, students were asked to follow a particular staged project development process to help them structure their learning and prevent them from 'rushing to solutions'. The Project Lead introduced the following quote to illustrate this point:

> This world is of a single piece; yet, we invent nets to trap it for our inspection. Then we mistake our nets for the reality of the piece. In these nets we catch

> the fishes of the intellect but the sea of wholeness forever eludes our grasp. So, we forget our original intent and then mistake the nets for the sea…They do catch the fishes, but never the sea, and it is the sea that we ultimately desire (Boles & Newman, 1990).

This was a recurring theme in the interviews. Several interviewees discussed the importance of holding participants back from identifying solutions to enable them to look at it from different angles. In doing so, the hope was that participants would recognise both the complexity of the challenge and the assumptions/biases that they brought to it. In doing so, they would fully engage with the Grand Challenge without becoming immediately reactive to it. In the context of the Covid-19 pandemic, one interviewee described this as the 'let's make a mask' approach:

> You often see groups [say] 'we're designing this', and because they put that lens on [they] don't see everything else. [By saying] 'We're going to do a mask, we're going to do a mask, we're going to do a mask' they don't allow for that exploratory moment' (Ana, doctoral student).

The Academic Leads interviewed also described other ways in which Grand Challenge participants were encouraged to break out of familiar patterns of thinking and/or behaviour. This included dance-inspired 'movement' classes, online meditation sessions and off-site visits. One iteration of the Grand Challenge was set 180 years into the future to ensure that student projects were not 'incremental' in nature. The Academic Lead for that iteration said that that they – and some of their colleagues – had initially been sceptical about this, but had been pleasantly surprised by the outcomes:

> [I thought that] when you design the future too far away, then you go for a fictional thing. I was wrong. Students were able to envision a far future that was credible (Ginevra).

Most interviewees recognised that disruption was not always a positive experience for students, particularly at the outset. In part, this was thought to relate to the nature of the brief, which was significantly more open than students were used to:

> Some students do very well with it, some don't…there's so much you could do…where do you actually situate yourself within [these] whole crazy systems? (Ana).

As such, rather than helping the students to make sense of the world the interviewees believed that the Grand Challenge set out to do the opposite. It revealed it to be complex, chaotic and unknowable. This was not always a comfortable experience for participating students:

> [Students] go through that unpleasant process of losing confidence in [their] beliefs. [It] doesn't necessarily mean you're going to change entirely your perspective but you have to be ready to not recognise yourself. [This] is quite uncomfortable… when you look at that sense of certainty that we [all] have a desperate need for (Ginevra).

This process of engaging with a supercomplex world that is 'radically unknowable' (Barnett, 2000) is a risky one. For students it threatens to rob them of comforting certainties and leave them cast adrift without fixed points of reference to orient to. Most interviewees discussed their hope that disruption was followed by transformation, and that students would experience some sense of resolution within the Grand Challenge which would allow them to feel positive about the possibilities of change at its conclusion:

> Your view…changes shapes. [You] started to stitch…fragments of different stories from different fields, which at the beginning might not make any sense. [There] is that magic moment where you… move yourself and find that these new…fragments come beautifully together (Ginevra).

It was also a risk for staff. Overwhelming students increased the risk of receiving poor student feedback, which has the potential to be harmful to the reputation of the institution and those staff leading the Grand Challenge. Their hope was that students would feel differently at the end of the Grand Challenge, and that student feedback would reflect this. To expect the cycle of provocation - disruption – resolution to be concluded in four weeks is ambitious. It is possible that promoting the Grand Challenge as an opportunity for students to make a difference reflects, in part, a desire to sustain the motivations of those faced with responding to unresolvable wicked problems.

The sense of disruption was not felt to be unique to participating students. Interviewees also described the extent to which the experience of leading a Grand Challenge had revealed some of the pedagogical assumptions that staff held. Marta

(Project Manager) felt that some academic staff took time to adapt to the openness of the Grand Challenge brief because they had a ‘mission to teach’. This manifested in a desire to ‘fill the gaps’ of knowledge that students had, which proved difficult given the nature of the project and the diverse backgrounds of participating students. Most interviewees agreed that a Grand Challenge was not about the delivery of content and that staff with a ‘tunnel vision’ would find it difficult to join the teaching team:

> When you use these kind of approaches you don't teach. You expose individuals ... You…absorb knowledge. You increase intuition. You expand the capability of tacit knowledge. You minimise the teaching part (Ginevra).

Conducting the Grand Challenge online had also presented difficulties for staff more familiar with campus-based delivery:

> It's a major change in terms of our skill set because we go from being lecturers to broadcasters and lecturers have feedback, broadcasters don't. [We] can't really see the audience if two thirds of people have [cameras and] microphones switched off. It doesn't give you much sense of…concentration levels or breathing rates or the things that we normally feed off (Marcus).

One Academic Lead felt that the process of working in partnership with external bodies had helped staff recognise their own biases. For example, John described an incident where a student directly challenged a senior executive from a multinational corporation on their environmental impact during one Grand Challenge session. Some staff were reported as feeling ‘uncomfortable’ with this because of the institution’s ongoing relationship with that corporation, which suggests that their own thinking was shaped by political concerns. John said that the senior executive appeared to feel no such anxiety. He later discovered that the student had been approached by another company to lead a sustainability project on the recommendation of the challenged executive.

Staff enthusiasm towards students achieving some sense of resolution within the bounds of the Grand Challenge contributed towards some mixed messaging. One Theme Leader stated that ‘we want answers’ and stressed the importance of students finding ‘global solutions that work [and] that take us to a new and better future’. This was a recurring theme in the various presentations. Students were told by Theme Leads and external guests that the world needed them to provide solutions

to the problems of the world, and that the challenges that they faced would provide a ‘unique window for creative impact’. This was not presented as an immediate or automatic process. For example, one Theme Lead stated that ‘We want to believe that the result of your creativity could have an impact. It could be 6 months. It could be five years ahead’.

The emphasis placed on the world *needing* the participating students was a troublesome one, that encouraged them to think that they were somehow special and uniquely able to find the answers to other people’s problems. This served both to rob those people of their agency by treating them as ‘objects that must be saved from a burning building’ (Freire, 1970, p. 65) and to implicitly present an undifferentiated view of ‘the world’ that did not confront complex structures of competing interests. For example, postgraduate students at a world-leading specialist higher education institution may be beneficiaries of an inequitable system, and not best placed to understand or address the problems of those with less privilege. The ‘setting the scene’ sessions tended to present social change as a relatively neutral and universal process, where everyone would benefit in kind from the ideas generated. There was little discussion about who was responsible for making the world an unsafe place in the first place, nor about the systems and structures that might frustrate the realisation of creative thinking. Androetti would likely describe this as a ‘soft’ form of global citizenship, even if the term ‘your’ was generously interpreted to be shorthand for ‘your generation’ rather a specific reference to those taking part in the Grand Challenge.

The emphasis placed on developing ‘real world’ solutions in the opening sessions was also at odds with the expressed views from staff interviewed as part of this research project. There was a consensus amongst interviewees that the process was more important than the product, and that participating students were unlikely to bring about change because of the scale and complexity of the challenges identified. Indeed, this Grand Challenge included a session on wicked problems that explicitly discussed how there were no right or wrong answers (only better or worse ones). Interviewees argued that, at best, the Grand Challenge could create the ‘conditions of change’ by developing novel thinking and providing students with a valuable experience that they could later draw upon. This sentiment was echoed by some of the student teams presenting case studies of previous projects. In particular, one

team asked the question ‘are we obliged…to produce something new?’, concluding that it was more important for them to find questions than solutions. Another team discussed the importance of taking the time to expose problems before seeking to confront them.

The tensions between the design of the Grand Challenge – which encouraged disruption, openness and process – and the delivery of the Grand Challenge – which encouraged iteration, ownership and product – demonstrated how difficult it can be to reconcile the empirical and actual domains. It also meant that participating students were presented with a safer one-way model of disruption which looks outward, rather than a more dangerous two-way version that fully explores complexity, complicity and competing interests.

Thinking globally

One of the fundamental characteristics of a Grand Challenge is that it seeks to improve some aspect of the world. In most cases this appeared to mean thinking globally, rather than locally. All of the academic staff involved discussed how important it was to situate their teaching and research practice within broader social, political and ethical frameworks. As such, they were enthusiastic about the opportunity to engage students in projects that explicitly address planetary goals:

> You need to be a global citizen, you need to understand that the raw materials for that product come out in the ground…that they produce effluent and contamination in the atmosphere, [that] the carbon footprint implications are huge and manufacturing processes may be dangerous or unsafe for human beings, [and that the] product [ends] up…either in the ground or in the world's oceans. We can't keep doing what we're doing (John).

> I think it's everything…the opportunity to make some kind of social improvement [has] driven my practice…since I was a student. [My] projects have gone from objects to networks, so I feel like I'm much more a [creator] of networks and connections and collaborative activity (Marcus).

This engagement was driven by a recognition of the harm that humans were responsible for and of the unsustainability of current practices:

> There's a responsibility there to not do things [as] we've always done them before (Edith).

Interviewees felt that students were equally passionate about the challenges that they were being asked to address, whether they relate to those focused on improving the human experience or those relating to the impact of human activity on the environment. Frequent reference was made throughout the interviews of students wanting to ‘make a difference’.

Some interviewees implicitly embraced Morin’s notion of ‘earth identity’ (Morin, 2001) by describing a universal sense of humanity that emphasised the things that we have in common. They presented challenges such as the climate crisis or the Covid-19 pandemic as ‘levellers’ that demonstrated our shared stakes, and criticised governments, organisations and individuals for failing to see the bigger picture:

> I think we've still got as a human race huge amounts to learn around behaviour and social responsibility and care and love and concern for each other (John).

This sense of a shared citizenship was rarely addressed directly within the taught sessions. Students were briefed about their ethical responsibilities during a single session designed to introduce institutional ethical approval processes. The purpose of this session was to provide guidance on how to ‘look after everybody’ involved in the research. This involved an introduction to institutional templates relating to gatekeeper letters, project information sheets and consent forms, as well as a detailed explanation of the institutional ‘checklist’ that all student teams would be required to complete. The checklist asked student teams to respond to a series of prompts to determine the types and levels of risk involved in their project, as well as document the steps that they would take to mitigate those risks. It was designed to help students to anticipate and respond to ethical concerns and protect those directly involved in the project.

In the enthusiasm to shape a ‘new and better future’ there was relatively little discussion about how students navigate the ethical issues involved in choosing which problem to address, how they determine their level or stake in that problem, and what other stakeholders should be involved in developing project proposals. There was also little discussion of how students might evaluate the impact of their projects beyond the Grand Challenge, particularly with regards to possible unintended consequences.

When discussing what it meant to ‘make a difference’ some interviewees identified potential tensions between planetary and local thinking. This encompassed fears of ‘erasing’ local identity through the adoption of universal approaches to human development. Ginerva (Senior Tutor) framed this in terms of ‘being aware of the global impact of your actions and therefore being aware of multiple realities and multiple values’. As such, the question becomes ‘makes a difference to whom?’. Ginerva also stated their preference for the plural term ‘societies’ over the singular term ‘society’ to express the idea that ‘we are a multitude’. Interviewees felt like the Grand Challenge offered an opportunity to draw on the diversity of the institutional community represented at the NCC, something which was not always reflected in other parts of the curriculum. For example, John felt that ‘We're producing a diet of education which is still very Western based, very European and, and [location]-centric [which] becomes very monoscopic’. For some, this feeling had been exacerbated by the experience of conducting a Grand Challenge online during a global pandemic where the majority of participants were in some form of lockdown. Seeing students in their homes across multiple time zones during online classes had helped staff to appreciate the diversity of contexts in which students were engaging with their studies. It also illustrated for some interviewees how universities can bring diverse people together to work on shared concerns:

> It’s a strange thing to understand sometimes. It's like a…concentrated drop of some kind of really intense liquid…Those relationships [are] small and tiny but incredibly, incredibly impactful (Edith).

At times, other interviewees appeared to adopt what Andreotti would describe as a soft form of global citizenship that emphasised the importance of caring for each other. For example, John stated that ‘we should be sharing our expertise [with] people who are really struggling’, particularly in relation to access to resources that some people are perceived to lack. This deficit model is one addressed by Andreotti in her framework for critical literacy, in which she argues that focusing exclusively on things that one group lacks risks robbing those people of their agency. John also felt that universities were well placed to do this in a ‘neutral manner; that was not ‘influenced by a particular belief system of government’:

> I think trying to look at it locally or regionally or even [by] country…is just not good enough. You can't hide behind borders. You can't hide behind governments (John).

In this statement, John is arguing that governments are unable to effectively address global concerns for two related reasons. Firstly, because transnational issues such as the climate crisis, the refugee crisis or the Covid-19 pandemic extend beyond a government's locus of control. Secondly, because governments cannot look beyond their own interests. It also implies both that those in higher education are able to maintain a critical distance and that global concerns are best addressed by those able to do so. These are contested ideas. The analysis presented in my literature review would suggest that those in universities are keenly aware of their own interests and could not be described as unpartisan. Equally, there is a strong argument that challenges are best addressed by those with the greatest stake in them.

The idea of Grand Challenge participants maintaining a critical distance also extends to the focus of the challenge. In one iteration, the challenges were presented as 'meta-challenges' or 'meta-issues' to reinforce the idea that students were not being asked to solve discrete problems. Interviewees discussed the difficulties that they felt students experienced when translating the intellectual challenge of the meta-issue to a specific project proposal:

> One of the really important things…to understand how to zoom out…to stand back and look at [the] global scale or national scale, and then actually to look and to find the best location for a project to make a difference (Marcus).

Interviewees discussed the potential impact of 'zooming out' on the motivations of participating students. Being exposed to the scale, complexity and wickedness of the problems identified might encourage feelings of anxiety and helplessness, leaving students lost within the meta-verse. This fear appeared to be unfounded. The majority of student teams were able to translate often abstract concerns into specific projects at the conclusion of the four-week project. A more significant and immediate barrier to the realisation of those projects appeared to be effective team-working.

Making connections

Interdisciplinary collaboration was considered both a means to an end and an end in itself. The unit descriptor made it clear that students were expected to be able to 'to work effectively in interdisciplinary groups and apply interdisciplinary… strategies' (NCC, 2020). Edith felt that half of the challenge of the first iteration of the Grand Challenge was 'really devoted to the students getting to know each other and their disciplinary backgrounds'.

There was a consensus amongst the Academic Leads at the NCC that participating students were often anxious about this aspect of the Grand Challenge. This may have reflected the lack of choice that students had. Student were allocated to project teams by staff, and were expected to stay within those project teams for the duration of the unit. Therefore, students were under considerable pressure to quickly form effective relationships with people that they had never met before. Most interviewees felt that the mark of a successful team was the extent to which they could think as a team, rather than as a collection of individuals:

> [It's important] to form relationships quickly and dynamically to coalesce very quickly as a team together. To think cohesively, and act as a team, and to also take on responsibilities that you…may as an individual take up or be given (John).
>
> It's an opportunity to set…aside your own agenda and [to] look at something that…you wouldn't be confident enough to tackle on your own (Edith)
>
> It is when we have to merge ourselves with another mindset that the real challenge starts (Ginevra).
>
> [There's] a magic glue that sticks together certain teams. They just have [that] enthusiasm, collaboration, and almost like a seamless lack of ego (Marcus).
>
> [They] know their place within the team. There's no dominating person that's…pushing (Ana).

The problem with the magic glue approach is that it is dependent on luck. You either have it, or you don't. If a project team is less fortunate and team members do not immediately find common ground, then the experience of collaboration could prove a difficult one. Equally, it may be that individualism is as much a symptom of poor team-working as the cause of it. If participants start to lack confidence in the

collaborative process or its intended outcome, they may respond by either distancing themselves from the group or in attempting to seize control of it. To minimise this threat of conflict both the postgraduate and undergraduate Grand Challenges set time aside at the outset to enable participating students to become familiar with each other and to negotiate ways to work effectively together. For example, the concluding part of the launch session for the postgraduate Grand Challenge involved a 40-minute presentation on approaches to successful team working. This included an introduction to different theoretical models of collaboration, examples of good and bad practice, and practical advice for how to form and sustain effective teams. This involved recognising the distinctive contributions that each member of the team can offer in service of the collective effort. Both undergraduate and postgraduate Grand Challenges hastened this process by conducting informal skills audit at the start of the challenge to help the students understand how they can work effectively together:

> [We asked] What is your personality type? How does it clash with other personalities? What [are] your strengths? What are your weaknesses? What do you want to get out of this? (Ana).

The clear message from the presenters was that teams need different types of people and that understanding and negotiating individual roles was an important part of the process. For example, the presenter discussed how someone acting as ‘grit in the oyster’ was important in provided a sense check for projects, but that too much grit would ‘sink a project’. Participating students were also given some advice on what to avoid. This included diving straight in without considering other possibilities, not getting to know each other, a growing divergence between individual and team goals, a lack of analysis and too little generosity. Above all, students were told to ‘park the ego’. Students were encouraged to adopt Kim Scott’s notion of ‘Radical Candour’, where team members both ‘care personally’ about the project, and are prepared to ‘challenge directly’ other members (Scott, 2017). To help in this process, the Academic Lead presented a standard set of ‘Team Rules’ as a starting point for students developing their own codes of conduct. These rules were:

- Defer judgement
- Encourage wild ideas
- Build on the ideas of others

- Stay focused on the topic
- One conversation at a time
- Be visual
- Go for quantity

These principles were consistent with the use of the ‘Double Diamond’ approach described earlier, which encouraged participants to develop as many ideas as possible in the initial ‘divergent’ phase. Project teams were encouraged to document these visually in an online collaboration board so that they – and their tutors – could get a sense of the themes that they were interested in. It is only in the later ‘convergent’ phase that students were encouraged to sift and sort through their initial ideas to choose the ones to develop further.

At the end of the session students were advised to share the results of their skills audit with their group, and introduce themselves by using the following three prompts:

- Show something that you’re proud of
- Show something that you love
- Show something you think will happen in the future

These discussions informed the development of bespoke ‘team code agreements’, which were intended to be used as a reference point for monitoring behaviour throughout the duration of the project. The message from the session appeared to be that teams were responsible for managing themselves, and that tutors would only become involved as a last resort. It concluded with the tongue-in-cheek statement ‘And remember every single word we said to you in the last hour and you’ll be fine’.

According to interviewees in the NCC, students often found the transition between individual- and team-based project work a difficult one. Interviewees described students as individualistic, independent or self-reliant, and discussed examples where students had been reluctant to cede agenda-setting or decision-making powers to others. Independently-minded students may have felt particularly uncomfortable that their assessment outcome was dependent on the performance of others:

> A lot of them do come with a degree of independence and…a kind of naivety and, perhaps, even slight arrogance…all of these things are very useful (John).

> They were competitive with each other which was okay to a degree, and in some cases that would do the same thing but differently (John).

This shift towards a more collaborative approach to leadership was considered a major challenge for students who had become used to systems that reward individual performance. It was also considered a very necessary transition to make as students prepare for life after graduation:

> You go through school as [an] individual, go to university as [an] individual. The minute you step outside the door, everything's about teams, networks, collaboration…you build this creative mind [and] in day one in your job [it's] smashed to pieces, and you have to rebuild it (Marcus).

All interviewees felt that it was important that the design of the Grand Challenge provided opportunities for peer-review throughout to enable groups to reflect on and respond to issues that might have arisen:

> [It's important that] there's an opportunity to take responsibility for your actions and to be accountable (John).

As part of this process of reflection, some interviewees felt that it was fundamental that participating students learned to take the time to listen to one another, rather than expect to be listened to:

> We try and make them aware that listening is probably one of the biggest things that they can do (John).

> The nature of the project is profoundly different…[It's] a good opportunity to listen more, to absorb more the diversity of the group that is going to work with you (Ginevra).

While intra-team conflict was not encouraged, neither was it considered something to be avoided at all costs. Indeed, some interviewees discussed how important it was to learn how to identify and address tensions as part of the process of collaboration. In doing so, they drew on their own experience of conflict:

> There are some teams… who do have personality fallouts or [the] odd student who decides not to fully engage and that affects the team's capability. I don't have a problem with that…you have to learn to cope with the good, the bad and the ugly (John).

> [You] develop understanding [about] what you can bring to the table [and] confidence, as well, to work with people that you don't know and who work in seemingly strange ways that you don't understand (Edith).

Staff were aware that many students had questions about why they had been allocated to a particular theme or group. They explained that groups had been allocated according to discipline, and advised students to make the best of the groups that they were in rather than seek to transfer. Despite this, conflicts were rare:

> [We] had like two or three meltdowns out of eighty. [That's] pretty good (Marcus).

In the case of the Grand Challenge affected by the Covid-19 pandemic, teams were also allocated by timezone, although some teams were still required to collaborate across multiple time zones:

> Students in China, students in London. That's eight hours difference so it's a whole different lifetime for each other (Ana).

On occasions, this has proved troublesome. One interviewee discussed how they had to intervene when they discovered that one team had been conversing almost exclusively in Mandarin, thereby excluding one team member who did not speak it. The interviewee had insisted that group sessions were conducted in English – as the institution was an English-speaking one – but had continued to feel concerned that this incident was indicative of broader issues within the team:

> 'I'm sure there was many more issues happening, that we couldn't really address, and I think I think more needs to be done if we are going to stay online…it's hard to know [if someone is] dominating the team…I think I would have liked to have a bit more training' (Ana).

One interviewee who had participated in a Grand Challenge both as a student and as a staff member discussed their own experience of poor team dynamics, which they attributed to a failure to communicate effectively. Although this experience had been

a negative one, it did not dampen their overall enthusiasm for Grand Challenges. Other interviewees felt that the nature of these disputes could be attributable both to individual clashes and to learned patterns of behaviour:

> [An] underground aspect of the Grand Challenge is actually getting people to understand…how you park the ego at the front door…[with] the good groups…everything's 'We'. [The] challenged groups are using the word 'I'' (Marcus).

> We might not be able to stop it because a lot of it [is] down to the individuals and the dynamics and all of the complicated nuances that go with…heavily gender biased spaces…things that you can't even begin to touch on in a four-week project (Edith).

The collaboration extended beyond the student teams. Interviewees discussed how the nature of the Grand Challenge subverted the student-teacher relationship by flattening the hierarches between them. In part, this was because the Grand Challenges extended beyond the expertise of the individual academic. It also owed something to the openness of the brief. In both the postgraduate and undergraduate Grand Challenges academics had been responsible for identifying the themes that participating students would be working within. Individual projects teams were, however, free to set their own brief:

> They are put in the same space…without academics being their tutors or leaders ... or bigger authorities. It's like a level playing field. [They may] have more knowledge and experience about this particular subject area but it doesn't mean that they're superior…It's exciting to see that (Marta).

> One thing that…for me stands head and shoulders above everything else is [that it's] something that we don't have the answer to. I think it's very common in education to give students…challenges [where] we know the answers or we've got them in our back pocket or…The important thing about a Grand Challenge is that [it's] new or emerging (Marcus).

In other respects, the Grand Challenge maintained the distinction between the teacher and student. At the NCC, academic staff were still responsible for setting the brief, for guiding the development of the projects and for assessing the project outcomes. This places them in a very different space than those participating. Even if

they were taking part directly in the Grand Challenge it could be argued that they would not be doing so on an equal footing. Nonetheless, the Grand Challenge does offer academic staff an opportunity to exchange ideas with students, something that interviewees felt was invigorating:

> [They were] bouncing with ideas ... people wanting to help each other while wanting to make things better without actually burdening other people (Marta).
>
> I think for staff and students to open up and know it's okay to talk and share and collaborate [and] work with different people. That for me is probably been the biggest success (John).

In part, this exchange was considered exciting because it crossed disciplinary borders. Bringing disciplines together was part of the stated aim of both the postgraduate and undergraduate Grand Challenges. This was thought to serve two principal purposes: to demonstrate to participants how differently people approach the same problem, and to generate better ideas. In doing so, they echoed Morin in rejecting a hyper-specialization that breaks complex patterns into partial fragments and denies the opportunity for synthesis (Morin, 2001). Placing students within interdisciplinary teams also adding complexity to the nature of the collaboration, both from the point of view of the organising team and the participating students, who were expected to negotiate this additional layer of micro-politics. Interviewees all felt that this was a price worth paying. They discussed how important it was to challenge presumptions of universality that students may have (i.e. that their experiences and ways of thinking are somehow 'the default'):

> I want them to have the understanding and experience before leaving the [institution]…that they understand different disciplines: how they think, what their philosophies are, and work with people they've never met (John).
>
> A Grand Challenge project is a real challenge in this sense, is an attempt to merge different worlds (Ginevra).

As such, the postgraduate Grand Challenge could be described as an interdisciplinary initiative that is characterised by sharing disciplinary perspectives, rather than a transdisciplinary one which attempts to look beyond them. Students were told to 'reject the limits that other people put on us' and 'start treading over those boundaries'. Participating staff described the differences between the

disciplines as ‘profound’, even though there were drawn from the same academic School. This School was, however, a large one that encompassed a range of disciplines with very different intellectual traditions, modes of practice, and student demographics. The interdisciplinary exchanges brought these differences into sharper focus:

> [I’d] observed that perhaps those differences weren't acknowledged sufficiently, or understood or respected… you can all be looking at the same thing and examining the same thing but there are lots of differences between them, and that they're all equally valid (Edith).
>
> However, the big surprise I think that is the outcome of a challenge is to realise our two different worlds (Ginevra).

This echoes Miller’s argument (2016) that interdisciplinarity helps to ‘unsediment’ individuals from their discipline. This includes both the distinct conceptual frameworks that inform their approach to problem-solving (Meyer & Land, 2003) and the ‘tribal’ identities which inform their behaviours (Becher, 2001). While this exchange was held to be one of the most valuable aspects of the Grand Challenge, it also led to the reproduction, on occasions, of familiar patterns of inequality:

> The discipline that I'm in [is] heavily gendered… it's quite important to…try and get these ideas of equality and respect [within] the student body (Edith).

Some interviewees found that roles within student teams were often allocated according to discipline and that certain types of disciplinary thinking tended to predominate in final projects. One interviewee found that ‘more sensory and exploratory’ disciplines that focused on the personal development of an individual’s practice tended to be dominated by industry-focused disciplines that focused on professional development:

> That moment of converging is…very difficult…students [have] very different mentalities, different ways of working. We do get a lot more the industrial [side] coming out (Ana).

As such, interviewees discussed the importance of participating staff having the skills, awareness and confidence to be able to work across different disciplinary domains and to challenge student teams that were defaulting to certain perspectives

or behaviours. This involved an awareness that the staff were also subject to the same assumptions:

> We realised that that we think very differently…tutors from [different programmes] interpret the briefs…in a very different way…what was for me [obvious] was not that obvious for someone else in the sense it was understood and interpreted in a different way (Ginevra).

At their best, the interdisciplinary project teams were thought to act as points of intersection where differences in discipline, language, culture, experience and interest were shared, leading to the development of new thinking that 'collapsed the biases'. This involved an openness to 'continuous debates' that do not end in consensus or agreement. One interviewee summed this up by stating that ingenuity was 'contagious' rather than contained within the 'genetics' of one person. There was, however, consensus amongst the interviewees that the success of the exchange was not measured in the project outcomes:

> When people come together from different disciplines. That for me is the most interesting part (John).
>
> I think when it comes to interdisciplinary, the real novelty, the real impact is in the process and not necessarily in the output (Ginevra).

This emphasis on process was at odds with the more competitive aspects of the Grand Challenge, which encouraged participating students to generate product outcomes that would bear comparison to those generated with other teams. This will be discussed more in the following section.

One key absence that I observed was any discussion of different models of team decision-making. It appeared to me that students were implicitly expected to work within a non-hierarchal model of teamworking where all members of the team have both an equal stake and an equal voice. In part, this could be explained by the desire to place the contributing disciplines on an equal footing. As the quotes above suggest, staff viewed the interdisciplinary nature of the Grand Challenge as an outcome rather than as a means to an end. Students were not encouraged to consider alternative models where authority is invested in a single individual or a leadership team that is expected to provide a vision, make critical decisions, and take responsibility for the outcomes of those decisions. Non-hierarchal models of team-

working may improve engagement with and investment in the decision-making process. They do, however, place tremendous emphasis on effective dialogue and negotiation. For example, within the four-week span of the postgraduate Grand Challenge, participants need to form a team with people they may never have met before to develop a project that addresses a complex global issue that, by definition, defies easy solutions. This involves defining a common goal, agreeing on a process of collaboration and generating a shared outcome. It projects teams don't immediately have that 'magic glue' that binds them together this can represent a significant challenge. This challenge may not be felt equally by different members of the project team. For example, Freeman disputes the notion that an absence of rules governing team behaviour necessarily leads to more equitable forms of collaboration (2013). Indeed, she argues that the absence of rules may promote inequality by failing to explicitly address prevailing power dynamics. Equally, different academic disciplines place different emphasis on collaboration. As such, students from more individualised disciplines have a significant disadvantage over students who have previous experience of and expertise in team-working.

Competing interests

The introduction of a student prize threatened to exacerbate the potential tensions between competition and collaboration, and was perhaps one of the most dissonant aspects of the Grand Challenge. During the launch event, the newly formed project teams were told both that the process was more important than the product, and that they were obliged to take part in a competition funded by one of the external Grand Challenge partners (a multinational corporation). At the conclusion of the unit one team from each of the seven themes would be awarded £700 to further prototype their projects. Of those seven teams, three would be later judged as Grand Challenge 'winners' and awarded a final prize of £2,500. Projects were judged against threefold criteria: 1) Is there magic? 2) Smartest innovation and 3) Global Impact. A further award - described as a 'runner-up' prize - was made to the project team who could demonstrate the best 'narrative journey'. Judgements were made by a panel of experts from 'Top Global Businesses'.

For the NCC the student competition enabled the institution to develop and deepen relationships with external partners, particularly those who could provide longer-term research and knowledge exchange opportunities:

> It's actually really good as well for us to build the jury, and to get all the jury members gathered to look at [the institution's] work…some of whom may not be very familiar with the [institution]…it allows us to…sell the inside workings, [the] quality of student work, the quality of student thinking (Marcus).

This was presented as a mutually beneficial arrangement, where the external partner was given privileged access to students, and the students were provided with professional development opportunities. The institution also benefited from access to external funding and expertise, which initially supported the design and delivery of the Grand Challenge and also promised further rewards if the relationship continues to develop. Partnerships also extended to community and charity organisations:

> [These] are usually partners in kind… people come along and give a talk…sometimes there's conversations in the margins, which help our thinking or make connections (Marcus).

In the Grand Challenge that was the focus of my digital ethnography, the lead sponsor was given significant prominence. A mid-challenge briefing session was co-branded between the institution and the lead sponsor, and the first 30 minutes of the event was focused exclusively on the sponsor. This included a 25-minute presentation by sponsor representatives on the journey of the company and why it had chosen to support the Grand Challenge, followed by a 15-minute question and answer session where those representatives answered questions posed by staff and students. The sponsor was also one of the 'top global businesses' tasked with the responsibility of judging the student competition, along with two representatives from a high-profile charity with relevance to the chosen Grand Challenge theme.

The involvement of commercial sponsors had potential implications for how freely students could engage with the Grand Challenge. For example, one of the Grand Challenge's commercial partners provided training to all students on the use of its visualisation tool, leading some students to ask whether they were required to use it; they were not. On a more profound level, it is possible that the direct involvement of global multinational companies throughout the Grand Challenge – including the associated competition – dissuaded teams from developing projects that offered a direct critique of those companies. As discussed in the literature review, the funding of Grand Challenges by wealthy individuals has been dismissed as a progressive gesture that enhances the social credentials of that individual without fundamentally

changing the business practices that generated that wealth. It has also been criticised for helping to shift the responsibility for public policy from government to the private sector, a process that has been described as ‘woke capitalism’ (Rhodes, 2021).

It was perhaps telling that students were informed about the funded competition before they were informed about unit assessment, with students being told by a Theme Lead that ‘It’s worth it because there is a prize’. This suggested that staff were using the competition to generate student enthusiasm for taking part, although no one interviewed as part of this research project appeared too concerned about levels of student motivation. This was, in part, because it was felt that the majority of students were already invested in social issues as part of their developing practice. It also reflected the fact that the Grand Challenge was a core unit, which students would have to pass in order to progress in their studies. The criteria for the competition were discussed in brief, although there was a degree of ambiguity about how the criteria would be applied. For example, the criterion ‘Is there magic?’ was described by a Theme Lead as evaluating a project’s ‘Wow factor’, and the extent to which a project ‘takes our breath away’. It was not clear to me from my interviews or digital ethnography why this was used as a criterion, particularly when it might encourage student teams to prioritise the subjective drama of a proposal over its potential impact.

Indeed, the introduction of a competition threatened to subvert the stated Grand Challenge ethos by creating a set of perverse incentives. Firstly, it could encourage participating students to focus on self-serving goals over intrinsic ones. The instrumental rewards could include preferential funding and professional development opportunities. Secondly, it could signal to participants that the outcomes of the projects are more important than the process, thereby encouraging them to ‘play safe’ and avoid experimental, challenging and/or unresolved projects that would be more difficult to neatly package and present to a judging panel.

Thirdly, by placing teams in direct competition with each other the Grand Challenge encouraged participating students to view each other as rivals rather than as a resource to draw on. In doing so, participants may be less inclined to be generous thinkers prepared to ‘assume good faith, seek to understand each other and are willing to ‘dwell in an ongoing disagreement and dialogue’ (Fitzpatrick, 2019, p. 53).

Equally, it ensured that the majority of participants ended the Grand Challenge with a sense of disappointment. In my interviews, Marcus felt that this was a reasonable trade-off because the competition served as a ‘a ‘great motivation for students’. Conversely, stoking a desire to ‘win’ might also encourage individual students or projects teams to become ego-driven, a trait that was heralded by the majority of interviewees as one of the most significant barriers to effective teamwork.

The issue of ego became a dominant one throughout the Grand Challenge. Invited speakers repeatedly reaffirmed the students’ sense of the Grand Challenge as a form of ‘calling’:

> This is a significant time for you to take this opportunity because you can shape not only your own future but the future of others and there are people with open ears and arms waiting for that.
>
> You do become a supercreative and people will listen to you that maybe didn’t listen to you before. People will take seriously even the most wacky, preposterous, simply crazy ideas. The most fragile little pieces of creativity. They can be taken seriously. They can be grown. They can be nurtured. And they can become life-changing.

These statements are almost certainly intended to be encouraging. The speakers are attempting to reassure students that there is a place in the world for them and give them the necessary confidence to engage fully in the Grand Challenge despite the difficulty, scale and complexity of the challenge. However, telling students that they are special creates pressure. This pressure has the potential of intimidating students who feel no such manifest destiny, and encouraging others to set themselves apart, both from other members of the group and from the people that they are intending to help through the Grand Challenge. This sense of distance created by the sense that ‘we’ are the supercreatives and ‘you’ are the subjects of our supercreativity could lead to projects that are inspired with a missionary zeal that assumes that people need saving, potentially from themselves. This evangelical tone was apparent in some of the quotes from winning student teams:

> We are going to use [this] as a tool to save the world. It’s really exciting for us.

Extolling an individualised notion of creativity can also encourage participants to place themselves above others. It may be difficult to collaborate with a ‘seamless

lack of ego' when each individual person within a project team is told that they are a special. It may also be difficult for project teams to remember that the act of 'making a difference' should focus more on the change and less on the celebration of those aspiring to be the change-makers.

Making the case

The tension between celebrating the change and the changemaker also played out at an institutional level. One of the key motivations for those developing a Grand Challenge was a desire to 'make a statement' about what is important:

> It's a really good opportunity ... to be able to say what you think matters. It's an opportunity for ... real positioning, and that in turn is quite powerful (Edith).

As such, the Grand Challenge served both to publicly highlight the contribution that higher education institutions could make to meeting social goals and enable those participating to influence what those goals should be. At an individual level, taking part in the Grand Challenge appeared to have helped interviewees reflect on the purpose of higher education, and on how their individual academic practice was informed by their sense of social responsibility:

> We're funded by taxpayers. We're funded by students. [We] have to have a social responsibility. And I don't think that can just exist as academic publications or people graduating. [It's an] opportunity for a significant impact (Marcus).

Ana praised the idea of an institution demonstrating its public commitment and encouraging its students to do the same. She did, however, also discuss how it might be more important to embrace a notion of social accountability where individuals and institutions are required to explain and justify decision-making:

> The UK [has a culture of] watching each other and keeping everyone accountable … I think, maybe, university students [should be] held to a certain degree towards that [standard] (Ana).

From this perspective, the principal purpose of the Grand Challenge was to encourage students to reflect on their own values and on the ways in which they applied those values to their emerging practice. This included a recognition of the impact that one's actions have on others; this interviewee felt that this sense of personal and social accountability was more prevalent in the UK than in the country

of her birth. The notion of reflecting on and demonstrating impact was also discussed at a sector-wide level. Marcus noted that initiatives such as the Research Excellence Framework (REF) and bodies such as UK Research and Innovation (UKRI) place a significant degree of emphasis on public impact. While acknowledging that universities should exist for more than the 'enrichment of academics' he expressed concerns about steering too far away from the 'Haldane Principle', where funding decisions are made through peer-review. He felt that focusing on the immediate goals of the public or private bodies providing funding would encourage academics to become risk-averse.

Developing a Grand Challenge represented its own risk to senior staff and sponsors. Edith felt that the involvement of a Senior Manager was critical, as they had both the strategic overview and the institutional influence to make such a high-profile initiative happen. She also speculated that it was attractive to Senior Managers because it gave them a rare opportunity to 'directly influence a curriculum'. In this institution, Senior Managers were once removed from the student experience; curriculum design was generally the responsibility of the Heads of Programme or Programme Leads and Senior Managers were rarely involved in day-to-day teaching. As such, the Grand Challenge enabled the Senior Manager to be involved in curriculum design and to engage directly with students. It also provided an opportunity to showcase the School's research expertise and provide opportunities to make connections between research and teaching activities. Edith did not regard the involvement of the Senior Manager as a threat to her autonomy.

Interviewees discussed the status of the Grand Challenge within their institution. Some interviewees in the NCC felt under additional pressure to make the unit meaningful because it was a mandatory:

> You've got some that really want to do it, you've got some [that] really hate to do it, and you've got some that really don't mind … It is difficult. Trying to position it to please over 400 people (Edith).

The perceived success of the Grand Challenge at the undergraduate institution also meant that it become mandatory for all first-year students for a time. Ultimately, however, it returned to being an elective extra-curricular offer because delivering it on such a large scale was considered 'a bit too much'. Despite the change in status the

institution has made a long-term commitment to the Grand Challenge, describing it as part of its ‘core business’.

At the NCC the Grand Challenge themes were agreed at a senior level before being handed to the Academic Leads to interpret according to their own research interests. In at least one iteration the external sponsors were involved in setting the themes. Academic Leads would then be responsible for the academic delivery of the unit, which included programming and facilitating the theme briefings, managing assessment and overseeing the network of theme tutors. Academic Leads agreed that the Grand Challenge needed a common structure that provided ‘scaffolding’ for students while giving them ‘freedom to interpret, adapt context, adapt challenge from [their] home perspectives’ (Ginevra). This common structure encompassed the learning outcomes, assessment deliverables, timetable, modes of teaching, and course management systems. Marcus described this ‘logistical engine’ as ‘90% of the challenge’. Beyond that, project teams could make their own choices. The openness of the brief was often described as a daunting task for both students and staff.

> I think, very often, we are at the mercy in a way of the projects that our students decide to pursue (Edith).
>
> We recruit students to take part in the programme without them knowing what they will do and what kind of problem they will be looking at and…what ideas they will develop (Marta).

In the case of the NCC, it presented project teams with a daunting challenge: to develop projects that demonstrated the unit learning outcomes, met the criteria for the associated competition and made a difference to others. Navigating these competing and sometimes contradictory priorities was a feature of the Grand Challenge, and perhaps one that fairly reflected the wicked nature of the problems that they sought to address.

Making a difference

My research results provide an insight into the different ways that participating staff and students attempted to ‘make a difference’ through the Grand Challenge. From an institutional perspective, students in the NCC had two principal motivations, one relating to their performance in a formal unit of study and one relating to a separate

funded competition. For the undergraduate Grand Challenge, it was explicitly promoted to students as an opportunity to develop the transferable skills necessary for a successful career. Marta felt that student recognised the value of this:

> Students [want] to have something on their CV … to have this edge ... they realise that just having a degree is not enough. So they look for placements, job opportunities, exchange global study abroad programmes ... all kinds of experiences and opportunities to develop experiences and skills (Marta).

Equally, one interviewee described how many students only realised in hindsight the impact that these, and similar projects, had on their own development:

> It's not just ... sentimental value … when I hear people talking about the [institution] they talk about about … an experience that has profoundly shaped them (Ginevra).

This expectation that the Grand Challenge could both provide short-term professional development for participants and help shape their long term identify is a bold one. It also perhaps indicative of a reluctance to choose between different goals. If staff did recognise a trade-off between short- and long-term ambitions, choosing the short term would lessen the disruptiveness of the exercise. Choosing the long-term would risk being seen to ‘under-perform’, although this risk may be lessened because the Grand Challenge had already secured the enthusiastic support of key senior managers. It is also possible that a ‘longer-term’ view could be used to dismiss negative feedback from participating students.

In the interim group tutorials I observed, most student teams already had a clear idea about what their proposed project was, and why they had chosen it. Four of the five projects I observed focused on some aspect of behaviour change, generally involving helping individuals make ‘better’ decisions or make connections with others through a new product. Prevalent themes in these projects were isolation, loneliness, relationships, protection and anxiety. Projects tended to focus on individual experiences of the chosen problem, rather than on its systemic causes. Only one of the teams had a more systems-focused approach which questioned some of the implicit assumptions around a particular public-sector service. This team would later go on to win one of the Grand Challenge prizes.

The format of these tutorials placed a significant onus on the tutor to provide instant feedback to project teams. From my experience, the tutor appeared able to evaluate each project quickly and astutely draw out key issues through a series of clarifying and open questions. Common questions included: ‘how did you choose this problem?’ ‘how would you engage users in your solution?’ ‘who would be excluded?’ and ‘what might be the unintended consequences?’ The majority of proposed solutions were presented in the form of narrative ‘user journeys’ that storyboarded how the solutions would be experienced by the defined user group. There was relatively little nuance or ambiguity presented in these journeys; they tended to follow the same pattern of ‘here is the problem, here is the solution and here is why the solution works’. In appearing to ‘rush to solutions’ these project teams appeared to be at odds with the Grand Challenge ethos described by interviewees. It is worth pausing to consider why.

The schedule of the postgraduate Grand Challenge meant that students had to progress quickly from divergent thinking to convergent thinking, meaning that they may not have able to fully explore the questions before feeling under pressure to provide the answers. The mixed signals in the launch events may have contributed to this haste. While the unit learning outcomes were clear that students were only expected to produce a proposal and ‘proof-of-concept’, I felt that the repeated calls to find solutions and the introduction of a competition that judged the ‘magic’, innovation and impact of those projects encouraged students to value the destination more than the journey. This was evident in the Final Review.

The projects presented in the Final Review were diverse in nature, embracing a range of different questions, approaches and ideas. There were, however, some common aspects across the different projects that I have used to develop a series of project types and indicative projects. These are my own invention, which draw on themes identified in my literature review and my analysis of the projects presented in the Interim and Final Reviews. In reference to my theoretical framework, these indicative ‘synthetic’ projects have enabled me to explore the actual domain of the Grand Challenge, even if the events in question have been sublimated and re-imagined. These are not intended to be mutually exclusive, and different projects may incorporate elements from multiple types. The six project types that I have identified are:

- Information projects
- Empathy projects
- Engineering projects
- Platform projects
- Exploratory projects
- Disruption projects

Information project: Breathe

Information projects are designed to support individual people to make informed decisions about some aspect of their daily lives. These generally involve technology-focused solutions that provide access to real-time data or relate to effective labelling of goods, services or agreements.

The *Breathe* app enables users to track pollen levels in urban areas. It uses real-time data from the pollen monitoring network to present a visual heatmap of the current pollen levels in the user's area and provides 'pollen forecasts' that uses weather data to make predictions about the week ahead. Users could also use the app to create their own 'pollen diary' to record how their daily lives have been affected by pollen levels. Through the app, users can choose to anonymously participate in a large-scale research study which shares their pollen data with university-based researchers to help understand the scale of the pollen problem across the UK.

The student team presented a summary of the impact of high pollen levels. This included an overview of the numbers of people in the UK who have hay fever, some case studies of how hay fever affects people's wellbeing and a brief discussion about the apparent links between allergies and anxiety. One of the project team discussed their own experience of allergies.

The tutors asked the student team how they expected people to use the app. The student team suggested that people could use it to avoid going out on days where the pollen count was high, or to help them decide when to take antihistamine medicine.

Empathy project: Grow

Empathy projects are designed to raise awareness of a problem by engaging an individual's emotions. It is based on the idea that change is only possible if enough

people care about an issue. It will usually involve encouraging people to identify with individual suffering. The implicit question behind many Empathy Projects is ‘How would you feel if this happened to you, or to someone you loved?’

This *Grow* project involves a Virtual Reality (VR) simulation of a life of Chestnut tree in Epping Forest. The simulation starts in a clearing created by the fall of large Chestnut tree. The user starts in the clearing before descending into the leaf litter to locate the nut that they will become. They will be responsible for the emerging tree throughout its lifecycle, subtly directing its growth through their movement through the three-dimensional space. Grow too fast and they will become vulnerable to high winds. Grow too slowly, and they will lose light as the canopy closes in around them. All the while, the user can experience the creatures that share your space, including those such as squirrels and bees with whom you have symbiotic relationship and those such as the Leaf Miner Moth that threaten your existence. The experience will be different for every user. The outcome will, however, always be the same. Their tree will fall, creating space for new life.

The project team presented a short trailer for the simulation, as well as a storyboard of potential user scenarios. They felt that an immersive story-telling approach would help people feel a connection with the tree, thereby encouraging them to care more about how trees are nurtured, celebrated and protected.

Engineering project: Pressure

Engineering projects are designed to improve some aspect of the world through technical innovation. This involves refining the design of an existing technology or inventing a new one that performs the same function. It can also encompass the development of new materials that allow something to be achieved faster, cheaper and/or more efficiently than before.

This *Pressure* project involves a design for a new shower head which is able to boost water pressure through manipulation of the turbulent flow. Existing products achieve this by including finer and fewer holes in the shower head. This product also includes modifications to the shape of the showerhead and the pipe connector to maximise pressure differential. Crucially, this shower head also maintains high pressure while minimising water usage, thereby promising to save millions of gallons of water a day.

The project team made a presentation that outlined the challenges of maintaining water supplies in urban areas with increasing population densities. They discussed how the climate crisis has the potential to make this challenge considerably worse and referenced a UN report which identified ‘access to water and sanitation for all’ as one of its six key sustainable development goals. They presented a model for much water would be saved, which drew on recent research on the number of showers taken in the UK per day, the average length of those showers, and the volume of water used per shower. The team calculated that, if the shower head was installed in every shower in the country, the amount of water required for showers in the UK would fall by 20%.

Platform project: Community Toolkit

Platform projects are designed to provide a new space for people to come together. This often involves creating a safe online or physical space for marginalised people who are isolated from and/or threatened by the wider society. Platform projects hope to develop new ways for people to make connections, often around shared interests or experiences. This will involve an emphasis on community-building.

This Community Toolkit project involves the development of a resource that provides people with accessible advice on how build and sustain effective communities. The advice is adapted from a TED talk from a celebrated Architect as well as an academic symposium attended by community managers from a range of public, private and third sector organisations.

The Toolkit has three elements:

- A colourful illustrated poster that introduces the key principles of effective community-building
- A checklist of the specific steps involved in effective community building, in both printed and online forms.
- A ‘Rules of Engagement’ template agreement which defines the expectations of individual community members and the processes for identifying and addressing intra-group tension.
- *Video case studies* from successful community leaders. This includes someone responsible for helping to revive the fortunes of a local market, a community manager for a popular tabletop battle game, and someone

responsible for moderating an online discussion forum for those affected by a chronic disease.

Exploratory project: Human Touch

These projects are designed to bring people together to investigate an issue or problem. The defining characteristic of an exploratory project is that it does not seek to provide solutions to any problems identified. As such, the process of engaging with the issue is considered more important than the product of that engagement. A satisfactory outcome of an exploratory project is the generation of new and more informed questions. Exploratory projects will often involve aspects of wider public engagement, which seek to encourage different community members to exchange thoughts on the chosen issue.

This project explored the future of work in an age of automation. The ‘robot revolution’ has already transformed the word of work, with the World Economic Forum predicting that half of all manual work will be done by machines by 2025. Computer intelligence will also replace - or augment - human intelligence in industries that are associated with human skill and complex judgements, ranging from robotic surgeries to trading on the stock market.

This project seeks to celebrate those industries that will still require ‘the human touch’. In doing so, it rejects a binary view of automation that presents it as either offering emancipation from suffering or an existential threat to humanity. Instead, it will seek to understand what makes us human, and investigate what we can offer to each other that a machine could not. This includes exploration of human qualities such as empathy, creativity, strategising, improvisation and story-telling.

The project will conclude with a symposium entitled ‘2050’ where speakers will present imagined case studies of the jobs that they do in the year 2050. This will include presentations from a lawyer, a chef, a childcarer, a filmmaker, a journalist, and a scientist. This will be followed by a workshop led by the Academic Leads where participants will be invited to collaboratively create a ‘Human Touch’ manifesto that defines the key principles for the development of and celebration of human-centred work.

Disruption project: The Confession

These projects are designed to challenge commonly-held assumptions in order to develop something wholly new. This will generally involve a process of abstraction, where individual events are related to fundamental principles or to the structures in which those events can be situated. The key question for a disruption project is 'why?'. Projects are designed to subvert expectations and reveal hidden interdependencies. They will often focus on uncomfortable issues, discuss systemic inequalities, and develop responses that challenge the status quo and, by extension, the interests of those who benefit from the status quo.

This project is focused on the climate crisis. It starts with a fatalistic assumption: that the planet has already reached a tipping point and that catastrophe is unavoidable. Instead of trying to promote individual or collective action the project is focused on helping people to make peace with this inconvenient truth through the act of atonement.

Through a series of confessional activities, project participants will encourage both individuals and organisations to explain what contribution they made to the worsening climate crisis and the reasons for their lack of action. This is not designed to inspire guilt or apportion blame. Rather, it is an attempt to understand how we all got to this point. As such, it functions like a 'Truth and Reconciliation Commission' in openly investigating wrongdoing without threat of censure or penalty.

The project involves three phases. The first of which involves the development of a 'Time Capsule' that tells stories of humanity's 300,000 or so years on the planet and the impact that human actions have had. The second is an interactive online confessional where people are encouraged to anonymously answer three questions: 1) how have you or your organisation contributed to the climate crisis? 2) what did you or your organisation do to prevent it? 3) what do you wish that you or your organisation would have done? The project will conclude with a symposium where the contents of the Time Capsule are revealed and invited speakers present their own confessions.

The project is founded on the idea that people broadly already understand how their individual and collective actions are contributing to the climate crisis. By moving the conversation from action to reflection, it is hoped that contributors are encouraged to be less defensive about their own motivations and more clear-sighted about the

systems and structures that deter meaningful collective action. While the project starts with a fatalistic assumption, it is designed to have a hopeful conclusion.

Project Critique

The *Information*, *Empathy*, *Engineering,* and *Platform* projects types have some common characteristics. Firstly, they are focused on individual responses to collective problems (Wilde, 2016). They will generally involve the development of some form of digital or physical product that an individual could use to make better decisions about their lives and to minimise the harm that they do to others. For example, in the 'Breathe' project, the app provide users with real-time data to avoid travelling to areas with a high pollen count. This benefits the user in the short-term and could arguably save lives by exposing vulnerable individuals to lower levels of risk. At the same time, benefits are usually tied to the use of the product. This can potentially lead to perverse consequences where the project exacerbates inequality by making those benefits exclusive to those who are aware of – or are able to afford – the proposed product. As Keri Facer argues, 'we need to rewrite the relationship between education, socio-technical change and the future if we are to ensure that [we] do not simply serve to produce futures of profound inequality and environmental degradation' (Facer, 2011, p. 14). In my interviews, Marcus described this as part of a '20th century industrial model' where everything was driven by a 'consumer mindset' that focused on the production of new goods or services that helped to create many of the problems that we collectively face:

> Science [is] great at developing technology…in some ways [this] has turbocharged climate change alongside [those] who are helping to package or…sell these things (Marcus).

He advocated for a more system-driven approach that rejects this model and focuses more on what you can take out of a system than what you can put into it. This is described as part of the 'Circular Economy' movement (Stahel, 2016). As such, successful Grand Challenge projects would rarely result in a physical product that would potentially only contribute more harm than good. This was indicative of an approach that addressed symptoms rather than problem:

> They did a buggy for children to be protected from air pollution. [I] raised this in the meeting… [it's] ironic that the development of your buggy will create

> more air pollution and, essentially, you want your buggy never to be used. (Ana).

Focusing on the individual does not exclude the possibility of inspiring collective action. That action, however, involves a process of aggregation, where the sum of individual actions creates the groundswell of support necessary to influence decision-makers. This is the type of 'New Power' thinking described by Timms and Heimans (Timms & Heimans, 2019). For example, a 'twitterstorm' of negative comments on social media might convince a company to withdraw advertising from a controversial television show, which in turn convinces a channel to withdraw that show from broadcast. The Grand Challenge projects presented, however, did not address this form of social action.

The second characteristic of the first four projects is that they focus on mitigating a known risk**.** This will generally involve developing a solution that addresses the symptoms of a problem, rather than the causes. For example, the 'Pressure' project identified the challenges of maintaining clean water supplies in urban areas but does not pause to question the reasons that water supplies are threatened such as overpopulation, drought and excessive consumption or to anticipate how new challenges will emerge. Risk mitigation projects generally focus on short-term benefits. Proposed solutions will promise to make an immediate difference if properly implemented. Usually, this will involve an iterative improvement to an existing solution, rather than a disruptive innovation that would represent a paradigm shift.

It is worth remembering that project teams were not required to find a solution, let alone one that had an impact. Both the unit descriptor and interviewees were clear on this:

> I think it's probably naive to think that you're going to find the solution…from a group of students working on something for a month…what you can do [is] set a catalyst going for the thinking that then works towards and will contribute to solutions (Edith).

> So, what you deliver at the end of this project doesn't have a real impact on society. [Projects] are not developed to the point that they are contextualised and tested in the context (Ginevra).

Interviewees did, however, feel that the duration of the Grand Challenge did enable participating students to meaningful engage with issues from a range of different angles. Ana made the distinction between the Grand Challenge and a ‘hackathon’ where people come together across a weekend or so to meet a specific challenge:

> You tend to get really good projects coming out of [the hackathon] but not fully fledged projects in the sense that you get to fully explore the topic and really find those nuances within it (Ana).

Students were described as enthusiastic about the opportunity to do something for others as part a process of ‘making sense of their place and time at university’. This leads to an ironic situation where students are excited about the prospect of solving a problem that they are not expected to solve:

> They genuinely come into it thinking ‘I can do something. I can make my mark. I can make a difference (Marta).

This has the potential to create a dissonance in participating students, who needed to be both sufficiently motivated by project outcomes to complete the Grand Challenge, and sufficiently sanguine about project outcomes to make the most of it. Interviewees felt that the emphasis of process over product was difficult to convey to participating students:

> How can I put this project to them and explain to them in advance what they are likely to take from [in a way] that is going to be useful to them (Edith).

Participants in the postgraduate Grand Challenge were briefed at the outset about the unsolvability of the wicked problems that they were presented with. One interviewee acknowledged this tension, while making the case for collapsing the presumed distinction between knowledge and action:

> That hybrid…is the product without the solution…the real value of the hybrid is the new knowledge that you've created, the way of thinking. That is what I think creates the chain reaction. That I think is the challenge (Ginevra).

A third characteristic of the first four project types was that the projects focused on unthreatening solutions. Solutions were generally be presented in wholly positive terms, and did not propose a trade-off in interests where one group risks losing out to another. This is described in economics as a non-zero-sum game. These projects

were unlikely to identify or address structural inequalities or engage fully with the complexity of the chosen topic. As such, the wicked problems became tame ones. For example, the Platform project aims to support people to create safe spaces for community-building but does not question the culpability that policy-makers have for enabling other spaces to be thought of as unsafe. Equally, the Empathy project attempts to make users identify with a tree through a form of anthropomorphism that ascribes human characteristics to a non-human lifeform, but does not reflect more broadly on the nature of the relationship between different forms of life.

If these types of projects embrace a process of change, it will be an incremental one that owes a debt to the 'nudge' theory of behavioural economics where people are encouraged to change their behaviour through positive reinforcement and indirect suggestion. They will not threaten to challenge power by focusing on issues of systemic inequality or collective culpability. The solution will often be a 'flashy' one that only serves to showcase the proposer's ingenuity, entrepreneurship and social credentials:

> Sometimes the best thing to do is give money to a homeless person rather than design a whole system that will help them get out of it…I think that's one of [our] biggest challenges…is acknowledging the beauty of just talking to people, doing small things (Ana).

Critically, teams that failed to question their own assumptions or fully engage in the ethical implications of their own proposals could unknowingly replicating existing social inequities:

> It's interesting to see the students also falling into that…trap [of] trying to address postpartum depression, but then the product is a very classist product that only [certain] women…could use…that's a challenge (Ana).

In contrast, *Exploratory* and *Disruption* projects are located within a critical context. The projects serve as provocations, helping both the participating students and a potential external audience engage with uncomfortable ideas and new ways of thinking. This involves an interrogation of the contrasting experiences, perspectives, and interests of different sections of society, as well as the relationships between them. Unlike the Empathy, Information, Engineering, or Platform projects, they do not seek to resolve complex problems through innovation targeted at the individual. In

contrast, they are prepared to stir up muddy waters. This echoes the intentions of interviewees such as Ginerva:

> An answer is an end point. You conclude something with an answer. [It] is a full stop…I think our responsibility is to create significant meaningful questions (Ginevra).

Interviewees such as Paul, Marcus and Ana all felt that successful project teams were able to achieve this. For example, one project involved a proposal for an integrated care system that placed emphasis on the 'celebration' of progress throughout a patient's recovery. This was lauded for challenging what was perceived to be a deficit model where the emphasis was on the progress yet to be made: i.e. the difference between the patient's current state and the desired end state. Ana discussed how teams were more likely to fully engage in the complexity of an issue if they had a personal investment in the issue being addressed:

> There was an interesting bunch of groups that did very well…that [had] a personal tie to it…I think those personal motives [really] drove the team together… You could see that they're…committed to it (Ana).

The majority of interviewees discussed the potential for Grand Challenges to create the conditions of change. In doing so, these Grand Challenge were presented as a form of dress rehearsal, giving participants the opportunity to safely engage with collaborative social actions projects in preparation for something to come:

> So this can become a kind of an archetype … a reference for others to … implement a project in a real context - and maybe a smaller scale - but with a deeper impact (Ginevra).

> Universities have a real luxury … they're places where one can think. And there's a responsibility which goes with that (Edith).

Paul felt that students were well placed to generate these questions because they tended to ask 'basic' or 'raw' questions that staff members had ceased to ask themselves. This was attributed both to staff recognising the difficulties of meaningfully addressing complex problems and to staff becoming inured to those problems. Part of this Grand Challenge experience was learning to engage with the complex ethical, moral and political questions that were generated. This extended beyond formal institutional ethical review process:

> [It] brings in…social context as well as social responsibility; understanding the impact of objects in environments. [That] was definitely much more of [a] secondary concern in the early phase of industrial…development. Now, it's actually probably the primary concern (Marcus).
>
> Someone claimed to be teaching ethics… they don't actually. [What] we really should be doing is developing ethics [for] a future which is not that far away … It's changing every second of every day (Paul).

The extent to which the Grand Challenge can indeed claim to provide students with the confidence, experience, and 'capabilities' to create change will be explored in the following discussion section.

Chapter 4: Discussion

This section reflects on the significance of my research project. It draws on both my literature review and research data to answer the question: how does the emergence of Grand Challenge projects inform the debate about the public role of UK higher education institutions? It does so through an investigation of the following sub-questions:

- Why have Grand Challenges emerged in UK higher education?
- Who are higher education-based Grand Challenges for?
- How should higher education-based Grand Challenges be designed?

This discussion section will be organised into those three sub-questions.

Why have Grand Challenges emerged?

Throughout this research my guiding methodological framework has been critical realism. The fundamental question in critical realism is ‘what would need to be true in order for this to be possible?’ This research project has sought to understand what would need to be true in order for a Grand Challenge to be possible?

A Grand Challenge is not an easy option. A lot of things have to align in order to make it happen. This includes senior managers able to commit political will and resources to the endeavour, academic staff able to translate that commitment into a coherent curriculum design, and administrative staff able to maintain the complex logistical engine required to run it. A Grand Challenge also places enormous demands on students, who need to be able to work collaboratively with people that they do not know to develop projects that respond to wicked problems that defy formulation and solution. The Grand Challenge team estimated that around 64,000 hours of creativity was committed to the iteration that I observed.

The first credited Grand Challenge existed because of a German mathematician’s desire to map the uncharted territory of this discipline. In my analysis, this should be considered more of an intellectual challenge than a Grand Challenge. It did, however, set the scene for future iterations. Grand Challenges issued through government, charitable foundations and higher education institution all share the same characteristics of encouraging participants to collaboratively develop ideas to address global concerns that aim to inspire interest, improve some of the world and

impel action. Grand Challenges in higher education institutions are, however, distinct in two fundamental ways. Firstly, they are not backed by significant financial resources. Secondly, they recruit their participants internally. Grand Challenges developed by governments and charities offer funding to encourage external participation. The principal resources that higher education institutions can draw on are members of its own community. As such, the Grand Challenge presents an opportunity for a university to bring members of its own community together at the clashing point to, in the words of UNESCO, 'contribute to the sustainable development of society and to the resolution of the issues facing the society of the future' (UNESCO, 1998)

There is no shortage of commentators who believe that higher education is ideally suited to addressing the challenges of a complex, uncertain and changing world. Whether through Morin's 'Seven complex lessons' (Morin, 2001) or through the capabilities approach developed by Sen (2009) and extended by Nussbaum (1990), universities are heralded as 'instruments of change' who can lead and support positive social transformation. Certainly, the staff interviewed as part of this research project felt that a sense of social responsibility was core to their practice. It is, however, unlikely that this is the first generation of university staff committed to social goals. In which case, perhaps the more pertinent question is 'why didn't Grand Challenges exist previously? After all, the idea of a collective 'call to arms' has existed long before David Hilbert presented his problems in Paris at the turn of the 20th century.

To help answer this question, I have identified three 'generating mechanisms' that help explain why Grand Challenges have emerged in UK higher education. In this, I do not mean to present a deterministic argument that assumes that the development of a Grand Challenge is an inevitable response to those conditions. My argument is that these three generative mechanisms in combination make it more likely that universities will develop strategies – such as a Grand Challenge - that demonstrate their public role. I would argue that if only one or two of the three identified generative mechanisms were present then the development of Grand Challenge is less likely.

The first generating mechanism is one of crisis. People perceive the world to be in a perilous state. This includes both immediate and existential threats to human lives. Indeed, this whole research project was conducted during a time of immediate crisis

which has introduced new deadly threats such as the Covid-19 virus, and highlighted existing ones, such as the racially motivated violence against black people, gender motivated violence against women and other forms of institutional discrimination. The existential threats are no less apparent. Whether it relates to the climate crisis or the rise of machine intelligence, many fear for our own future as a species, and for those species who share the planet with us.

This fear might come as a response to a ‘Great Transition’ that we’ve made (Raskin et al., 2002) that has us entangled within supercomplex systems of mutual dependency (Barnett, 2000). As such, the noise of our constant interactions has overwhelmed our individual and collective capacity to make sense of them. In doing so, we become hyper-aware of myriad problems across the world, often able to follow tragedies in real-time as they unfold. This fear may not accurately reflect the actual likelihood of harm (Lloyds Register Foundation, 2020). Conversely, it may be that this period of ‘turbo-capitalism’ has both increased the likelihood of disruptive shocks and reduced our capacity for dealing with them (Gasper, 2013). This sense of fear was a recurring theme in the interviews that I conducted. Individuals repeatedly talking about their concerns about the future, and their frustration that irresponsible human actions are exacerbating existing problems and generating new ones. For example, interviewees stated that ‘We can't keep doing what we're doing’ and talked about the responsibility ‘not do things [as] we've always done them before’. As such, the development of Grand Challenges by governments, charities and higher education is a response to this sense of precariousness.

The second generating mechanism is one of powerlessness. A complex, chaotic and unknowable world that operates like ‘a moving whirlwind with no organising centre’ (Morin, 2001, p. 21) exists beyond the control of individuals, organisations or states. This loss of control can be disquieting. As Ana states ‘where do you actually situate yourself within [these] whole crazy systems?’. One response is to wholly embrace the ‘New Power’ values of participation, transparency and networked governance (Timms & Heimans, 2019). This, however, does not provide the certainty that, according to Ginerva, ‘we [all] have a desperate need for’.

Higher education-based Grand Challenges offer another response to this sense of powerlessness. They provide a global take on the problems identified that reflects the international perspectives, demographics and interests of its community. As John

states ‘You need to be a global citizen’. By bringing different disciplines together, and providing them with access to expertise beyond the institution, Grand Challenges offer the possibility of being able to, in the words of Ginerva, to ‘stitch…fragments of different stories from different fields’. This is why Grand Challenges are always collaborative, and usually interdisciplinary. The scope and structure of the Grand Challenge enables those initiating and participating in it to ‘work towards a shared understanding that is something more than we can bear alone’ (Fitzpatrick, 2019, p. 55). The difficulty of this, however, is providing sufficient space for participants to consider their own positions and to start to develop the intellectual and ethical anchoring necessary to navigate a changing world. Expecting Grand Challenge participants to develop answers that ‘take us to a new and better future’ may make them excited about the prospect of ‘saving the world’. It is also like asking someone to solve a jigsaw puzzle when you know they do not have all the pieces.

The third generating mechanism is one of status anxiety. Throughout this research project, there was much discussion about what a Grand Challenge could offer to the world and to participating students. Interviewees discussed how the Grand Challenge could tap into the ‘supercreativity’ of its community to ‘create the conditions of change’ and offer solutions to some of the world’s most pressing problems. There was relatively less discussion about what the Grand Challenge offered to the institution.

Grand Challenges represent an opportunity for higher education institutions to assert a public role at a time when that sense of publicness is under question. In the UK successive governments have embraced the forces of marketisation and globalism by commodifying education (Barnett, 1999) and shifting the cost of university tuition fees from the state to individual students (Boni and Walker, 2013). In doing so, they have positioned themselves as ‘regulators’ of the higher education market, seeking to hold institutions accountable for the quality of their provision and for graduate outcomes (Watson, 2006). This has enabled them to maintain control of higher education policy-making while avoiding responsibility for decisions made. As such, the relationship between state and institution has changed. Expectations have grown, and public funding has diminished. UK Governments have sought to actively promote consumer approaches to education – characterised by concerns about value for money and returns on investment - through initiatives such as the Teaching

Excellence Framework, through bodies such as the Office for Students, and through repeated ministerial speeches focused on university failures relating to issues such as free speech (Syal & Mason, 2017) social mobility (Donelon, 2020) and quality and standards (Williamson, 2021). This has threatened to 'hollow out' universities by first converting education into a product, and then entering that product in a global marketplace where universities are in competition.

As a consequence, the UK higher education sector has arguably found itself caught between students and government, unable to satisfy the expectations of either. Worse still, it has conspired in this process because an endemic status competition within and across individual universities prevents them from thinking or acting collectively. Institutions celebrate league tables if they are ranked higher than their competitors (Swartz et al., 2018) and individuals within those institutions see each other as rivals (Fitzpatrick, 2019). As a consequence, institutions have failed to challenge the narrative of failure that has emerged. For example, there has been relatively little challenge to the idea that higher education institutions are responsible for what happens to students beyond graduation. This is a standard that no private sector business is expected to meet. Gyms are held responsible for the service that they provide, not the health, fitness and wellbeing of those with a membership card.

I believe that this is the fundamental challenge for a marketised higher education sector. As a public sector institution, it is asked to meet conflicting social goals such as generating and sharing new ideas, enabling social mobility, developing informed and ethical global citizens, stimulating the 'knowledge economy' at both a local and national level and training the workforce of the future. As a private sector institution, it is asked to deliver a high-quality consumer experience that both demonstrates value for money and balances the books. As such, higher education institutions have tried – and failed - to meet the impossible demands of a public sector institution on private sector financing. I believe that Grand Challenges are one example of the ways in which UK higher education has attempted to seize control of that narrative. This response is driven both by the existential threat that the marketisation of higher education represents to the public service mission of higher education, and the existential threats that we all collectively face in a perilous world that we feel powerless to change.

A Grand Challenge is also an attractive option because it embodies a public purpose model that enables institutions to set the terms of their social responsibilities, rather than a public impact model in which those terms are set by others. Those leading higher education institutions know that knowledge is no longer considered an end sufficient to rest in; the newspaper headlines, regulatory frameworks and funding models make this clear. A Grand Challenge provides an opportunity to seize control of the narrative and project the image of a globally-engaged forward-thinking institution. It is, perhaps, telling that Grand Challenges have proven most popular in high status institutions such as University College London, the University of Cambridge and the University of Exeter who have both the ambition and the intellectual/economic resources to look to address the problems of the world. Lower-status institutions may be more likely to respond to the same generating mechanisms with community engagement and widening participation schemes that prioritise the local communities in which they are situated.

Who are Grand Challenges for?

If Grand Challenges exist as a response to concerns about precariousness, powerlessness and status, there remains the question of who they exist for. Through this research project, I argue that Grand Challenges that involve taught higher education students primarily exist for the benefit of those taking part. As Marcus states in my interviews, the issues addressed through a Grand Challenge are complex; they are not ‘something that starts and finishes in six months time. It's something which you keep having to work out’. Governments and charities may have the time and money to keep working things out and effect meaningful change. Taught students are unlikely to have either.

This creates a contradiction. One of the dominant themes in my interviews and digital ethnography was the idea of people being attracted to a Grand Challenge because they wanted to ‘make a difference’ by improving some aspect of the world. However, the call to action may be better directed inwards rather than projected outwards. By inviting students to work collaboratively across academic disciplines to identify and address global problems the Grand Challenges send the message that it is both necessary and possible to do so. That is why the invited speakers were such an important part of the Grand Challenge. As well as providing a range of different perspectives on each theme, they also presented a vision of what was possible.

Whether it was discussing sanitation in a refugee camp or filter bubbles within social media these speakers were people who had chosen to act, thereby offering a potential antidote to feelings of powerlessness. Those speakers did not present the case that positive social change was easy to achieve. Indeed, many of the speakers emphasised both how hard it was to work within hostile, complex systems and how much of a long-term commitment was required to meaningfully address the issues identified. Many speakers were frank about the difficulties that they had faced and the mistakes that they had made along the way. Crucially though, the overall message was a bold one: prepare to engage, prepare to fail, prepare to try again.

This shift in emphasis is, in some ways, a subtle one. Staff already acknowledge that the process is more important than the product. As Edith says ‘it is naïve to think that you’re going to find a solution from a group of students working on something for a month’. Three of the five Grand Challenge aims focused on different aspects of student learning; the remaining two focused on meeting new people and tackling global issues. Equally, the unit learning outcomes use words such as identify, explore, translate, and propose. In the course documentation there was no mention of solutions.

There were, however, plenty of references to solutions in the taught sessions. Participating students were repeatedly told that they were special and could provide answers to questions that the world was waiting for them to provide. One Theme Leader stated that ‘we want answers…that take us to a new and better future’. This dissonance also played out in the associated student competition that judged the innovation, impact and ‘magic’ of projects and ensured that most students ended as losers. Those who ‘won’ the Grand Challenge were quoted as saying that they wanted to ‘save the world’. This motivation appeared genuine, if a little vainglorious. It was also not the stated ambition of the Grand Challenge. Participating students were not the agents of transformation. They were the locus of it.

This may be a difficult message to communicate to students. Ginerva’s interview comments that ‘what you deliver at the end of this project doesn’t have a real impact on society’ may not be the rallying cry that students want to hear at a Grand Challenge launch. However, by having the confidence to lose certainty, embrace dissensus and to ‘stay with the trouble’ (Harraway, 2016) students can start to develop the ‘ethical anchoring’ (Barnett, 2000) necessary to make sense of the

epistemological and ontological ‘disturbances’ caused by living in a supercomplex world. This extends far beyond the idea of stopping students ‘rushing to solutions’. As Ginerva stated ‘an answer is an end point…a full stop…our responsibility is to create significant meaningful questions’.

One such meaningful question is: who does the world need saving from? Student projects rarely addressed this question. The majority fell into one of the four categories that I developed: information projects, empathy projects, platform projects and engineering projects. These projects shared in common a tendency to focus on the individual, involve the mitigation of a known risk and fail to challenge power. Responsibility for change is shifted from structures to individuals. As one interviewee stated: ‘focus on the individual, obscure the system’. It is at the systems-level that the most profound changes are likely to occur. As discussed in relation to both critical realism and Stephen Lukes’s ‘Three faces of power’ (Lukes, 1974), the forces that most powerfully shape decision-making relate to systems and structures that may operate beyond our knowledge of them. A person may be aware of the decisions that they make, and how they have exercised their agenda-setting power to constrain decision-making, but they may not understand how they themselves are subject to systems that make certain decisions unthinkable.

As a consequence, the projects tended to present ideas that were relatively safe. These projects addressed symptoms rather than causes, and presented solutions that presumed that everyone would benefit in kind. This type of thinking is unlikely to lead to the paradigm shifting ambitions of a challenge that is defined by the grandness. That is why the projects that I have categorised as Exploratory or Disruptive projects become so important. These come closest to resembling the ‘critical pedagogy’ advocated by Freire when he argues that promoting social and economic betterment without acknowledging existing inequalities is irresponsible. In addition, these types of projects recognise the reasons for inaction. As one Grand Challenge speaker stated ‘be aware of what you are asking users to give up in doing something new’.

Another meaningful question that was rarely asked was: who is doing the saving? Believing that you are doing something for someone else’s benefit is not the same as doing so. There are numerous examples of the potential harm that is done by well-intentioned people, from the ‘soft’ forms of global citizenship promoted through the

‘Make Poverty History’ campaign (Andreotti, 2016) to the devastating consequences of conversion ‘therapies’ that attempt to persuade people to renounce their sexuality. That is why the ‘do no harm’ approach to ethics is not sufficient for a Grand Challenge. This research has helped to demonstrate why it is important for students participating in a Grand Challenge to take the time to locate themselves in the project, and to critically engage with questions of ownership, agency and social responsibility.

In particular, the question of ownership is a fundamental one. Collaboration is an essential characteristic of a Grand Challenge. Students are required to work in teams to define, develop and demonstrate their projects. This sense of shared ownership arguably runs counter to the student’s previous educational experience, which is focused on them as individuals. It also runs counter to the messages from national policy-makers, which emphasis that the individual student consumer is king (Barber et al., 2013) and that they should shop around (Competitions & Market Authority, 2015) for value for money (McVitty, 2019). This emphasis on student individuality proves troublesome when those students are faced with complex entangled problems that exist beyond an individual’s capacity to understand or meaningfully address. As Marcus states ‘The minute you step outside the door, everything's about teams, networks, collaboration…you build this creative mind [and] in day one in your job [it’s] smashed to pieces, and you have to rebuild it’. Even though students were told to ‘park the ego’ at the launch of the postgraduate Grand Challenge, many of the structures surrounding them encouraged them to do no such thing.

The Project Swap in the second iteration of the postgraduate Grand Challenge provides a useful case study of what happens when feelings of ownership are challenged. In this example, project teams were randomly assigned someone’s else’s project idea mid-way through the Challenge and told to ‘make it work’. This is a common experience outside of higher education; those working in larger organisations will be used to the idea of being assigned to a project, or joining a project when critical decisions had already been made. Within a postgraduate higher education institution, students are used to making their own choices. This was why the announcement was greeted with a ripple of shocked silence. The Project Swap is a truly disruptive idea because it challenges implicit notions of what the purpose of education is – improving the capabilities and life chances of an individual – and lays

bare the part that ego has in helping to construct the ‘narrative of self’ (Giddens, 1991).

The notion of the heroic individual also extends to our engagement with others. As such, I would argue that the celebration of one’s ability to empathise is mis-placed. In this, I would disagree with Morin (2001) that we need to embrace an ‘earth identity’ that promotes an abstracted sense of kinship with those we do not know. It encourages people to imagine the experience of others, instead of bringing those affected into the conversation, and is unlikely to make an actual difference to their lives; disaster victims are unlikely to take solace in discovering that someone reading a newspaper half a world away feels bad.

Fully embracing the idea that the Grand Challenges based in higher education institutions are for those participating in them does not lessen their significance. It does, however, change how people engage with it. Priority can be given to helping students reflect on the process, develop new ways of thinking, and reflect on the key ‘critical literacies’ (Andreotti, 2016) required to make sense of the relationship between knowledge and power. This includes a rejection of the idea that universities are neutral spaces. Universities are part of society, and can generate and are subject to forces that operate within that society. For example, there are many areas where universities are associated with causing problems rather than solving them, whether it is failing to pay staff a living wage (Grant, 2021), or maintaining inequitable admissions practices (Zimdars, 2016). This sense of humility would help to counter claims from authors such as Readings and Marginson that universities are wholly self-serving, and prioritise their own interests over those of others. It should also change how institutions should discuss the Grand Challenge. Rather than presenting it as an example of the contribution that universities make to society, it becomes a means of asking fundamental questions about society.

Designing a Grand Challenge

> Ours is only a little power, seems like, next to theirs.’ Moss said. ‘But it goes down deep. It’s all roots. It’s like an old blackberry thicket. And a wizard’s power’s like a fir tree, maybe, great and tall and grand, but it’ll blow right down in a storm. Nothing kills a blackberry bramble (Guin, 2012, p. 572).

The quote above is taken from Ursula K Le Guin's Earthsea books. The witch Moss dismisses the power of wizards as grand in appearance but lacking firm foundations. From her perspective, a witches' power may appear slight in comparison, but has the deep roots necessary to see out the storm. There are, perhaps, parallels between this and the Grand Challenges that have been the focus of this research.

Part of the problem may be the word 'Grand'. Enthusiasts for Grand Challenges may argue that the 'grandness' relates both to the scale of the problems identified and to the scale of the response required to address them. At the same time, the 'grandness' could relate to the assumed status of the problem solvers. If institutions develop a Grand Challenge as a response to self-serving concerns about their status, and participating students are celebrated as uniquely possessing the creative 'superpowers' necessary to 'make a difference', then there is a risk that the Grand Challenge becomes a self-congratulatory exercise. In this they become another example of higher education institutions demonstrating their good intentions - or their 'public purpose' - on their own terms.

I would, however, argue that it is essential that UK higher education institutions do explore issues of local and global responsibility. Indeed, I would argue that they are uniquely placed to do so. Private sector organisations cannot do it effectively because they are always bound by the profit-motive, which functions as their 'Third face of power' (Lukes, 1974). Unprofitable ideas become unthinkable, because they would threaten the interests of the organisation. That is why cigarette companies are not best placed to lead policy on public health, and oil companies are not best placed to lead energy policy. Equally, private sector organisations operate in a market structure that is defined by competition. That is why they guard knowledge rather than share it. A brilliant idea is worth nothing if you cannot keep others from it. As a result, the private sector is not best placed to address the problems of an entangled, precarious world. As one Grand Challenge staff member asks in one briefing session 'Are we right to trust capitalism to be able to force out these great solutions?'

Equally, individual states cannot effectively address global issues because they prioritise the interests of their own citizens above those of other states. For an individual state, your nationality matters more than your level of need. The global response to the ongoing refugee crisis helps to demonstrates this. For example, the UK government's 2021 decision to turn back migrant boats in order to prevent those

on-board seeking asylum placed those people in more danger by extending their time at sea (Gillet, 2021). Individual states, even those described as ‘superpowers’, cannot hope to control a supercomplex world. Neither immediate threats such as the Covid-19 pandemic, or existential threats such as the climate crisis can be countered on a state-by-state basis, even if individual states can lead the way in demonstrating what could, and indeed should, be done. In the same way that streetlighting could be described as a ‘public good’ because benefits are non-rivalrous and non-excludable, these threats could be described as a ‘public bads’ because the dangers are commonly shared, although individuals and states are able to preferentially protect themselves by mitigating the impact of those dangers.

Higher education institutions are, on the other hand, well placed to engage with a complex, precarious world. The intellectual curiosity that Newman champions in his ‘Idea of a University’ helps, in principle, to enable those in university to question assumptions, challenge power and to be more clear-sighted about the systems and structures that deter meaningful action on shared problems. Higher education institutions should be places where it is possible to think the unthinkable. This involves being prepared to ‘dwell in the ruins’ rather than succumb to the nostalgic impulse to restore what was lost. Grand Challenges can be an important part of this process.

To conclude this research project, I have developed the following guiding principles that inform the design of Grand Challenges. In doing so, I have attempted to acknowledge the tensions and contradictions within the generating mechanisms that give rise to it. First among them is the ‘Grandness’ of the challenge, which risks celebrating the virtue, ingenuity and boldness of the problem-solver over the problem. Equally, it encourages participants to develop projects that a grand in scale, rather than considering a more localised approach that explores how specific communities are affected by the systems in which they operate. As such, the term ‘Grand’ is a hinderance, and should be abandoned. These guiding principles draw on each aspect of my research project, including the expertise and experiences of the Grand Challenge staff who were so generous with their time. Aspects of these principles are already embedded within the Grand Challenges that I studied, and have contributed towards the ongoing success of those initiatives.

Guiding principle 1: generate responses (not solutions)

The Challenge should ask participants for responses rather than solutions. All of the problems that students face will be wicked ones, that defy easy formulation and solution (Rittel & Webber, 1973). Wicked problems operate within complex, open, and dynamic systems, with every new action likely to generate its own consequences which 'escape from [their] intentions' (Morin, 2001, p. 71). By framing the Challenge in terms of responses rather than solutions, participating students are encouraged to see their projects as part of an iterative cycle, rather than as a stopping point.

The term 'response' also helps to acknowledge that the goal is not to make the world safe. As such, those involved should be prepared to engage directly with unsettling things and help others do the same. This way, they can ask the type of 'raw' and 'basic' questions that had not been considered, either because they challenge powerful interests or because they have are considered unthinkable (Lukes, 1974). As such, the goal of Challenges should be to open up conversations rather than to close them down.

Guiding principle 2: think together

The Challenge should ask participants to think together, both within and beyond the institution. It is inherently both a collaborative and interdisciplinary approach because it seeks to bring together people with different experiences, backgrounds and perspectives to respond to complex issues. This focus on 'contagious' teamworking runs counter to the current orthodoxies in education which tend to promote individualism, independence and self-reliance; an approach which has been enthusiastically championed by UK policy-makers keen to embed marketised values in the sector.

These different perspectives should extend out beyond the walls of the university. The Challenge requires higher education institutions to reject a 'splendid isolation' and take on the role of facilitator. This involves bringing different stakeholders into the conversation and ensuring that they have the opportunity to both speak and listen. A key part of thinking together is acknowledging the different interests involved. The interests of a Chief Executive of a multinational health corporation are likely to be different from those of a frontline hospital nurse, in the same way that the interests of a consumer buying a new phone are likely to be different from the interests of a factory worker who assembled the phone. These differences should be

explored through a generous thinking that emphasises understanding over judgement and condemnation. This does not mean attempting to force a false consensus. The Challenge should embrace dissensus.

This facilitation also involves a process of letting go. This has three aspects. Firstly, it asks participants to let go of authority; the Challenge should not be framed around the idea of what 'we' can do for 'them'. Secondly, it asks participants to let go of status; the Challenge should not conclude with a declaration of winners and losers. The greatest resource that participating students have is each other, so the Challenge should adopt a peer-learning approach that encourages students to openly share ideas, approaches and feedback. Lastly, it asks participants to let go of ownership. The Challenge should celebrate the contributions of all those involved, rather than seeking to lay claim to responses as a demonstration of institutional worth.

Guiding principle 3: reflect on obligations

The Challenge should ask participants to reflect on their obligations to each other. This involves exploring the different ways that we are connected within complex systems, and on the ways that these entanglements can be exploitative. This should be presented as an iterative process. As Reading states, 'we can never settle our obligations to other people' (Readings, 1996, p. 189), either within or beyond university walls.

Student teams should be asked to 'make the case' for their response by articulating why they have chosen to address this challenge, what they bring to the challenge and how their challenge response can be justified. This idea borrows from the theory of *contractualism* developed by moral philosopher T.M. Scanlon (Scanlon, 2000) in his book 'What we Owe to Each Other'. This theory states that the ultimate test of an action is the extent that it can be justified to those with their own interests to pursue. If no one would reasonably reject a proposed action then it can be deemed as a good one. This includes some consideration of future actors as well, so that responses are guided by longer-term considerations.

This form of contractualism is favoured over softer forms of citizenship which encourage people to embrace an 'Earth identity' (Morin, 2001) and care more for each other. These approaches tend to address symptoms rather than causes, fail to acknowledge patterns of culpability and/or causation, and can be easily withdrawn

when inconvenient. This is not intended be a straightforward process and will rarely produce definite answers. The act of articulation is designed to inform the responses of participating students by making explicit unspoken assumptions.

Guiding principle 4: support participants to act in the world

The Challenge should ask participants to reflect on what it means to 'make a difference'. In common with other approaches – such as problem-based learning – the Challenge aims to provide a transformative experience for students. Where it differs is the explicit ambition to enable transformation beyond the institution. Critically reflecting on what it means to lead and support change should form a core aspect of the Challenge.

This process can be a troubling one. The act of 'zooming out' on a problem and investigating systemic causes might also engender feelings of helplessness. After all, if superpower states and multinational corporations cannot wholly control the tides of global decision-making then what chance do Challenge participants have? Equally, taken on a sufficiently large scale the meaningfulness of all human actions is called into question: 'In the long-run, we're all dead' (Keynes, 1923, p. 80).

These motivational concerns may explain why it is tempting to promote the idea that the world needs the 'creative superpowers' of university students. Challenge staff should, however, resist the temptation to promote an ideal of exceptionalism. There are numerous reasons for holding onto hope; human action does not need to be grand to be meaningful. Students engaging with the Challenge should be asked to explicitly reflect on how their participation has made a difference to them. As Arendt argues, when people act they tell the story of their lives and 'thus make their appearance in the human world' (Arendt, 1998, p. 179). As such, it is through our actions that we understand ourselves.

Guiding principle 5: share responses

The Challenge should ask participants to share their responses so that others can learn from them. This should be a core part of the experience, rather than an afterthought. The claim that higher education institutions exist for the public good depends, in part, on them creating and sustaining open networks where knowledge is freely shared, debated and developed. Indeed, these 'New Power' values have been a part of higher education since its inception.

The commitment to sharing responses helps to build on the previous guiding principles by providing a platform to help people think together, reflect on obligations and act in the world. This platform should look beyond the ownership of individual institutions to create a shared legacy that is available to all. In doing so, it will not demonstrate public impact. It can, however, help to tell the story of the public role of higher education, in the same way that individual responses can tell the story of those participating.

Chapter 5: Conclusion

My research project investigated how the emergence of Grand Challenges informs the debate about the public role of UK higher education through a critical analysis of why Grand Challenges have emerged, who they are for and how should they be designed. Grand Challenges are initiatives that bring people together to identify and address global address global problems, such as those that relate to health and wellbeing, climate change, security and sustainability. Universities promote them as an opportunity to make connections, develop transferable skills and to make a difference in the world. The research employed a methodological framework called critical realism, which involves identifying 'generating mechanisms' in the real domain through an exploration of lived experiences in the empirical domain and events in the actual domain. It involved two principal methods of research: interviews and digital ethnography. I conducted six interviews with key staff responsible for initiating, designing and delivering an institutional Grand Challenge, as well as digital ethnography of one Grand Challenge based in a postgraduate higher education institution.

For this thesis project, I have defined a Grand Challenge as an initiative that encourages participants to collaboratively develop ideas to address global concerns. It has three characteristics:

- It aims to inspire an interest in a shared concern
- It aims to improve some aspect of the world
- It aims to impel action

My research suggests that they have emerged in UK higher education because of three generating mechanisms. The first is one of crisis. People perceive the world to be a perilous state, presenting both immediate and existential threats to human existence. As such, Grand Challenges offer one way in which universities can 'contribute to the sustainable development of society and to the resolutions of the issues facing the society of the future' (UNESCO, 1998).

The second generating mechanism is one of powerlessness. This perspective is based on the idea that we are undergoing a 'Great Transition' (Raskin et al., 2002) in which the world has become entangled within supercomplex social, political and economic networks. This makes it both 'radically unknowable' (Barnett, 2000) and

vulnerable to shock (Gasper, 2013). Grand Challenges respond to this by providing a global take on global problems, and by promising to stitch together ‘fragments of different stories from different fields’ through interdisciplinary collaboration. By doing so, they aim to provide participants with the intellectual and ethical anchoring necessary to navigate a complex, confusing and uncertain world.

The third generating mechanism is one of status anxiety. Grand Challenge represent an opportunity for higher education institutions to assert a public role at the time when that sense of publicness is under question. Successive UK governments have sought to embed market values into higher education by withdrawing public funding, positioning themselves as a regulator defending the interests of student-consumers, and introducing an accountability model that requires institutions to demonstrate public impact. In doing so, they have worked to embed a marketised model of higher education where individual institutions focus their energies on competing for resources against each other, both at a national and international stage. Higher education has been vulnerable to these forces because of an endemic status competition within and between institutions (Readings, 1996); their self-serving natures enabling others to dominate them through division and disaggregation (Watson, 2006). As such, Grand Challenges have proven attractive to some UK higher education institutions because they embody a ‘public purpose’ approach that enables them to set their own terms of engagement with the world. That engagement has tended to be one-way, presented in terms of what ‘we’ can do for ‘you’, rather than reflect on the obligations we have to each other.

Higher education-based Grand Challenges are one expression of this desire to demonstrate this public purpose. My research suggests that, while participants were attracted to the idea of making a difference to others, the principal benefits of the Grand Challenge were to those taking part. This is something already understood by key academic staff who conceded that student projects do not ‘have a real impact on society’ because the issues addressed were ‘not something that starts and finishes in six months time. It’s something which you have to keep having to work out’. This also reflected the ‘wickedness’ of the problems addressed, which defied formulation and are ‘at best…only re-solved over and over again’ (Rittel & Webber, 1973, p. 160). It was also reflected in key student-facing documents, such as the unit descriptor. Conversely, I also found that staff enthusiasm contributed towards some mixed

messaging. Students were told that ‘we want answers’ and that they should find ‘global solutions that work [and] that take us to a new and better future’. Invited speakers repeatedly reaffirmed the student’s sense of the Grand Challenge as a form of ‘calling’ where they could apply their ‘supercreativity’ to shape the future of people who were waiting with ‘open ears and arms’. This dissonance also played out in the associated student competition that judged the innovation, impact and ‘magic’ of project outcomes.

My research suggests that the higher education-based Grand Challenges should fully embrace the idea that the process is more important than the product. This means setting aside the notion that it is something done for others. By acknowledging this, the Grand Challenge can focus on helping students to develop the ‘critical literacies’ (Andreotti, 2016) and ‘ethical anchoring’ (Barnett, 2000) necessary to make sense of the epistemological and ontological ‘disturbances’ caused by living in a supercomplex world. In doing so, I argue that the Grand Challenge represents the latest iteration in a long line of university-based initiatives that seek to bring students together at the ‘clashing point’ (Snow, 1959) to investigate the problems of the world. It also leans on well-established practices such as Action Research which assert that ‘eager people feel to be in the fog’ (Lewin, 1946, p. 34) and are looking for opportunities to transform good-well into effective action. As such, the Grand Challenge comes enable participants ‘to be bold, to be open, to experiment, to take action, to try the possibilities of things’ (as quoted in Weintraub, 2009).

Through a series of synthetic case studies, I identified three common characteristics of student projects that prioritised product over process. The *Information*, *Empathy*, *Engineering* and *Platform* project types were more likely to focus on individual responses to collective problems, aim to mitigate known risks and develop unthreatening solutions to that did not challenge power. In doing so they failed to identify and/or address structural inequalities or engage fully with the wickedness of the chosen topic. They also tended to emphasis the problem-solver over the problem. I also developed two further project types – *Exploratory* and *Disruption* projects – that illustrated how these concerns could be addressed. These projects served as provocations, helping both the participating students and potential external audience to ‘stay with the trouble’ (Harraway, 2016), engage directly with unsettling things and help others do the same. This involves an interrogation of the contrasting

experiences, perspectives and interests of different sections of society and the relationships between them. I used these imagined projects types as inspiration for the development of a set of five guiding principles that have been created to inform the design of Grand Challenges.

These guiding principles draw on each aspect of my research project. Engaging with these principles would enable UK higher education institutions to embrace a public role as places where people can 'dwell in an ongoing disagreement and dialogue' (Fitzpatrick, 2019, p. 53). This facilitation role is one that cannot be easily replicated by other types of institutions because universities are not bound by the profit-motive or beholden to national interests. These principles are:

- *Generate responses (not solutions*): by framing the Challenge in terms of responses rather than solutions, participating students are encouraged to see their projects as part of an iterative cycle, rather than as a 'stopping point'. This reflects that the problems are wicked, operating within complex, open and dynamic systems which defy easy formulation or solution.
- *Think together*: the Challenge should bring those with different perspectives, experiences and interests into the conversation. These differences should be explored through a 'generous thinking' model that emphasises understanding over judgement and condemnation so that participants can 'work towards a shared understanding that is something more than we can bear alone' (Fitzpatrick, 2019, p. 55).In doing so, those taking part in the Challenge should remember that external guests are supporting them learn, rather than asking for help. As part of that process, participants should seek to put aside claims of individual status, ownership and reward.
- *Reflect on obligations*: the Challenge should employ a critical literacy approach (Andreotti, 2016) that investigates the different ways in which we are connected within complex systems, and on the ways in which these entanglements can be exploitative. This should be presented as an iterative process as 'we can never settle our obligations to other people' (Readings, 1996, p. 189). In presenting responses, participants should articulate why they have chosen to address the Challenge, what they bring to the Challenge and how their response can be justified.

- *Support participants to act in the world:* student responses should create the conditions for change by providing participants with the capabilities and confidence to act with integrity, whether those actions are small-scale or part of broader social movements.
- *Share responses*: participating students should share their responses so that others can learn from them. This commitment to maintaining open networks where ideas can be freely shared, debated and developed should be a core part of the experience. This principle builds on the previous principles and helps to create a collective legacy for the Challenge.

Through these principles the Challenge can disturb the circles by bringing people together to ask troublesome questions and, in doing so, encourage them to have the boldness to act and the humility to consider the consequences of those actions. In the words of Octavia E. Butler:

> ‘To benefit your world,
>
> Your people,
>
> Your life.
>
> Consider consequences.
>
> Minimize harm.
>
> Ask questions.
>
> Seek answers.
>
> Learn.
>
> Teach.’
>
> (Butler, 2016, p. 351)

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Appendix 1: Interview Questions

Section 1: Designing a Grand Challenge

- How did you get involved in this Grand Challenge?
- Why do you think that this Grand Challenge was developed?
- What do you think are the defining characteristics of a Grand Challenge?
- What difference do you think a Grand Challenge can make, and to whom?
- What do you think was the purpose of the student competition?

Section 2: Experiencing a Grand Challenge

- What do you think most excited students about taking part?
- What do you think most concerned students about taking part?
- What were the key challenges for students?
- What were the key challenges for you?
- What do you think makes for a successful project team?

Section 3: The public role of higher education

- How important is a sense of social responsibility to your practice?
- To what extent do you think a university has a public role and/or responsibilities?
- How do you think that a university should engage with external stakeholders, such as local communities, external partners and/or policy makers?
- To what extent do you think of your higher education institution as a global one?
- Has anything else occurred to you while we've been speaking?