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Impact Culture: Transforming How Universities Tackle Twenty First Century Challenges

Mark S. Reed[1]* *and Ioan Fazey*[2]

[1] Department of Rural Economies, Environment & Society, Thriving Natural Capital Challenge Centre, Scotland's Rural College (SRUC), Edinburgh, United Kingdom, [2] Department of Environment and Geography, University of York, York, United Kingdom

New ways of doing research are needed to tackle the deep interconnected nature of twenty first century challenges, like climate change, obesity, and entrenched social and economic inequalities. While the impact agenda has been shaping research culture, this has largely been driven by economic imperatives, leading to a range of negative unintended consequences. Alternative approaches are needed to engage researchers in the pursuit of global challenges, but little is known about the role of impact in research cultures, how more or less healthy "impact cultures" might be characterized, or the factors that shape these cultures. We therefore develop a definition, conceptual framework, and typology to explain how different types of impact culture develop and how these cultures may be transformed to empower researchers to co-produce research and action that can tackle societal challenges with relevant stakeholders and publics. A new way of thinking about impact culture is needed to support more societally relevant research. We propose that healthy impact cultures are: (i) based on rigorous, ethical, and action-oriented research; (ii) underpinned by the individual and shared purpose, identities, and values of researchers who create meaning together as they generate impact from their work; (iii) facilitate multiple impact sub-cultures to develop among complementary communities of researchers and stakeholders, which are porous and dynamic, enabling these communities to work together where their needs and interests intersect, as they build trust and connection and attend to the role of social norms and power; and (iv) enabled with sufficient capacity, including skills, resources, leadership, strategic, and learning capacity. Based on this framework we identify four types of culture: corporate impact culture; research "and impact" culture; individualistic impact culture; and co-productive impact culture. We conclude by arguing for a bottom-up transformation of research culture, moving away from the top-down strategies and plans of corporate impact cultures, toward change driven by researchers and stakeholders themselves in more co-productive and participatory impact cultures that can address twenty first century challenges.

Keywords: impact culture, research impact, co-production, boundary organizations, participation

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University of Jaume I, Spain

***Correspondence:**
Mark S. Reed
mark.reed@newcastle.ac.uk

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INTRODUCTION

The world is facing challenges of unprecedented complexity and uncertainty that are bringing us to the edge of planetary boundaries where ecosystems may collapse, threating societal well-being and prosperity (Rockström et al., 2009; Steffen et al., 2015; Nash et al., 2017). Working with these challenges, such as keeping global warming to within 1.5°C of pre-industrial levels (Article 2, Paris Agreement, 2015; IPCC, 2018) will require social, institutional, and technological transformations on a scale not previously seen. In this context, universities and research funders are increasingly positioning themselves to produce knowledge to address these issues.

This civic or societal mission is increasingly being codified and operationalized as impact[1], driving the design of research policy and institutional structures and processes that seek to assess "objective" outcomes from research that can be quantified and rewarded. These assessments have led to a narrowing of the types of knowledge and impact that are valued and deemed legitimate (de Lange et al., 2010; Smith et al., 2011; Parker and Van Teijlingen, 2012), leading to gaming behaviors, and an increase in stress and anxiety among researchers who are increasingly held accountable for the public goods arising from their use of public funding (Watermeyer, 2019). Nevertheless, higher education and research institutions and funders are increasingly investing in impact (Oancea, 2019). This has built significant capacity for impact across the sector, including specialist staff, training courses, internal impact grants, sabbaticals, awards, and the creation of boundary organizations (Watermeyer, 2019). As a result, impact is now widely considered to be a key component of an institution's research culture (Alene et al., 2006; Leeuwis et al., 2018; Moran et al., 2020).

However, limited attention has been paid to the growing importance of impact in research culture, including the values, beliefs, and norms of researchers and how they or their institutions find and articulate meaning and purpose in relation to research impact (Moran et al., 2020; Rickards et al., 2020). We refer to this as "impact culture" and seek to understand how more or less healthy impact cultures might be characterized, and the factors that shape these cultures. To do this, we develop a definition, conceptual framework, and typology to explain how different types of impact culture develop and how these cultures may be transformed to empower researchers to co-produce research and action that can tackle twenty first century challenges with relevant stakeholders and publics.

BACKGROUND

Although there is limited research on impact culture, there is growing literature on research culture and culture change within Higher Education institutions. Some have argued that it is not possible to define a research culture at an institutional level, given the division of research between differently managed faculties with different research traditions (Deem and Brehony, 2000; Becher and Trowler, 2001). Notwithstanding debate over the appropriate organizational scale at which research cultures develop and persist, the organizational culture literature typically defines research culture as the shared values, beliefs, and norms of an academic community that influence its behaviors and research outputs, and which then define the collective identity of that community and distinguish the strengths and foci of one institution from another (after Hildebrandt et al., 1991; Evans, 2007; Schneider et al., 2013; Shah et al., 2019). Alternatively, many psychologists and sociologists study culture by understanding how people find meaning as individuals (on the basis of their own perceptions), collectively (on the basis of social norms and shared perceptions), and through their relationship with objects (Ashforth and Pratt, 2003; Mohr et al., 2020). Given the important role of values and meaning in these two understandings of research culture, impact may play a crucial role in shaping an institution's culture, providing both important values and meaning to justify and so underpin the production of research. Indeed, Chubb (2017) showed how researchers from more applied disciplines often felt personally validated and their work legitimized by the increasing recognition afforded to impact in UK and Australian universities.

However, this research also provided evidence that researchers from arts, humanities, and pure science disciplines, whose work was of less immediate or obvious public interest, were concerned that their work was expected to generate impact, and felt that their academic freedom was under threat from the increasing evaluation (and especially metricization) of impact (Bulaitis, 2017; Chubb et al., 2017; Chubb and Reed, 2018). In a recent survey of over 4000 UK researchers by the Wellcome Trust (Moran et al., 2020), three out of the top five words researchers used to describe their research culture were "competitive," "pressured," and "metrics." Research has always been competitive, but now researchers are also competing to gain the trust of stakeholders who might be able to give them impact. To the "publish or perish" mantra, we have added "impact or implode" (Reed, 2021), as universities, governments, and funders demand that researchers prove the value of their research to society. Indeed, 75% of those responding to the Wellcome Trust survey felt their creativity was being stifled by an "impact agenda" that was increasingly driving their research (Moran et al., 2020). Similarly, Chubb and Reed (2018), based on interviews with UK and Australian researchers, heard stories of researchers who had stopped asking the questions they thought were most important, because they were not impactful enough to be funded. It is clear that the impact agenda is generating its own negative impacts on research culture. Ironically, the impact agenda may be compromising the capacity of research institutions to address global challenges.

As such, it is important to understand how the impact agenda is shaping organizational cultures across the sector, and how these cultures may be re-shaped to avoid the conflicts of interest, demotivation of researchers, and other negative unintended consequences that are increasingly associated with impact. In one of the few attempts to characterize the development of impact

[1]We define research impact as "demonstrable and/or perceptible benefits to individuals, groups, organizations, and society (including human and non-human entities in the present and future) that are causally linked (necessarily or sufficiently) to research" after (Reed et al., 2020, p. 3).

culture, drawing primarily on Australian experience, Rickards et al. (2020) proposed three generations of impact culture. First-generation impact culture, they argued, focuses on making rigorous research more relevant and accessible, promoting messages from research to a wide audience, and encouraging end users to use it. As a result, first-generation approaches focus primarily on communication, equipping their most senior researchers to work with the mass media or social media to get their message across to as many people as possible. They also tend to focus on tackling visible impact challenges (Fazey et al., 2018), such as the creation of new medical treatments or drugs.

Second-generation impact culture is more two-way, according to Rickards et al. (2020). It shifts the focus to working with partners to ensure research is both relevant and legitimate, and quantifies the value generated for these partners. For example, the "triple helix" model of the university (Leydesdorff, 2012) has been extended to a quintuple helix model in which the activities of universities are conceptualized as intrinsically intertwined with those of business, government, civic society, and the environment (Carayannis et al., 2012). Second-generation approaches focus on improving "research impact literacy" (Bayley and Phipps, 2019) across the institution and equipping researchers at all career stages with the skills they need to understand and meet needs among stakeholders and publics. They are as likely to focus on more conceptual impact challenges as they are to tackle visible challenges (Fazey et al., 2018), for example shifting behaviors or other causes of the symptoms for which others are creating drugs.

Third-generation impact culture seeks to examine, and where necessary question, the assumptions driving the systems that both generate and apply knowledge, asking who generates what knowledge for whom, for what purpose, and why (Rickards et al., 2020). Third-generation impact culture does not assume that universities are even necessary to generate the knowledge or impact that society needs. As a result, third-generation cultures are open to systemic innovations in the way researchers work, creating safe spaces in which researchers and partners can try out new ideas without fear of failure, and providing the support to refine, adapt, and mainstream the best ideas, even if these disrupt the current status quo. They are more likely to focus on systemic and transformative change, moving beyond technological and behavioral change to transform systems and structures (Haberl et al., 2011; Kanger and Schot, 2019; Victor et al., 2019) and underlying beliefs, assumptions, values, and mindsets (O'Brien and Sygna, 2013), including changing the assumptions held by researchers about how change itself happens (Hodgson, 2013, 2019; Connor and Marshall, 2015; O'Brien, 2016). As a result, these cultures are more likely to tackle existential challenges (Fazey et al., 2018), for example, tackling the cultural drivers of unhealthy behavior or trying to transform the medical model that uses drugs to treat symptoms because it is cheaper in the short-term than funding social prescribing programs or "lifestyle medicine" that attempts to tackle the causes of poor health.

The three-generation model explains how impact culture may develop over time or to different degrees, and characterizes some of the activities that are likely to be found in different types of impact culture. However, it has less to say about the drivers of impact culture (including the role of researchers, stakeholders, and institutional co-ordination in constructing impact culture) or the ways in which universities may need to transform their operating models in response to these drivers, to facilitate more healthy impact cultures that are more likely to tackle twenty first century challenges. It is also not clear if impact cultures necessarily evolve in "stages" from first to second and then third generations, or if culture change processes can "leapfrog" the earlier stages. Impact culture may also not be homogeneous across an institution, and it may be possible for all three generations to co-exist within the same institution as different groups develop their own cultures. For this reason, we sought to develop a conceptual framework that could be used to both evaluate and shape impact culture proactively in response to change without further disempowering researchers through top-down, technocratic approaches, whilst providing an alternative explanation for how impact cultures may evolve and co-exist in research institutions. The next section explains how this was done.

APPROACH

The insights in this paper were based on a narrative literature review and further developed over the course of a year of dialogue and workshops with professional services staff working on impact, senior managers in universities, and researchers from a wide range of disciplines (e.g., biomedical, physical and natural sciences, social sciences, arts and humanities). Narrative literature reviews are more appropriate than systematic reviews where it is not possible to identify specific outcome measures, and the aim is to provide an expert-based synthesis of a broad range of literature (Baumeister and Leary, 1997; Greenhalgh et al., 2018). We integrated literature from a wide range of disciplines and fields, including research impact, cultural sociology, research ethics, public engagement, participation, deliberative democracy, individual values and self-identity, social and cultural values, the psychology of meaning making (in particular the meaning of work), motivation, social learning, social capital, trust, social norms, power, responsible research and innovation, capacity building, leadership, and organizational development.

The literature review led to the development of an initial conceptual framework, which was refined iteratively through 11 training workshops with different universities in the UK, Australia, and Sweden. These workshops were designed to create a safe space for participants to critically evaluate and discuss challenges and successes in their own culture and learn from each other. The proposed framework helped them consider how different elements of impact culture could be built or enhanced in their own contexts, but also allowed for new insights to emerge that helped to further develop the framework. Between the workshops, bi-lateral discussions also took place between the co-authors, and between the lead author with trainees and others working on impact culture internationally, further shaping the work.

As such, the insights in this paper came from a reflexive interplay between different kinds of knowledge, from many different people with different experiences and backgrounds.

This included iterative development from working initially to articulate the authors' implicit knowledge in ways combined with epistemic knowledge (written accounts from other studies), which were then explicitly articulated, tested, and refined through social learning and different forms of interaction, to lead to a new set of insights expressed in this paper. Much of the learning that led to our insights thus emerged through the interplay between the dynamics articulating, connecting, embodying, and empathizing knowledge, as described in seminal work on learning (Nonaka et al., 2000; Wenger-Trayner and Wenger-Trayner, 2020). Thus, while our insights were not derived from traditional academic empirical approaches, they did come from creative processes conducive to advancing conceptual understandings of impact culture and what might be needed to facilitate change to improve it. Further, the insights were explicitly meant to be a combination of what we know now (usually considered to be experience of, or evidence from, the past or the present) with a normative and desired sense of what should be. Such approaches are consistent with calls for the development and application of future methods that enable the enaction of ideas that support change (Fazey et al., 2018, 2020). The outcome has been a refined framework and set of insights that can be applied, tested, and further refined through and across different disciplinary and institutional contexts. This outcome includes a definition, framework, and typology that are rooted in existing literature and shaped by the experience of many who currently work in diverse domains of research and knowledge creation.

IMPACT CULTURE: A CONCEPTUAL FRAMEWORK

The conceptual framework that emerged from the iterative process described in the previous section describes a number of connected domains within which impact cultures may develop and be lived out in research institutions. The framework is bottom-up, starting by understanding how impact interacts with the purpose of individuals and groups as they find meaning in their work, and how this in turn influences their identity and motivation as researchers. As individuals with a shared purpose begin to form groups and create community, different sub-cultures, rooted in very different values, beliefs, and norms, are likely to emerge across an institution. Although these groups may sometimes work at cross purposes, the flourishing of multiple impact cultures underpinned by different purposes and values is an important expression of academic freedom and agency. Such a bottom-up approach may co-exist and interact productively with more top-down, collective approaches to creating impact cultures around institutional visions, missions, and values. However, we argue that participatory change from the bottom up is more likely to achieve meaningful and lasting change in the practices and behaviors of researchers, and so deliver impacts that are consistent with their values, beliefs, and norms, maintaining the motivation of researchers as they address twenty first century challenges.

Rather than expecting all researchers to engage with impact, there is room for pure, basic, and non-applied research, which has no obvious impact, alongside more applied, action-oriented research designed explicitly to tackle societal challenges, with researchers drawn to impact on their own terms, as opportunities intersect with their interests and values. While extrinsic incentives, in the form of research funding and impact assessments, have increasingly driven engagement with impact around the world (Reed et al., 2020), it has also driven negative unintended consequences, as outlined in the Background section. An approach that seeks to build more on the diverse intrinsic motivations of researchers may be slower to affect behavior change. However, the changes that occur are likely to be deeper, longer lasting, and less likely to lead to the conflicts of interest, mistrust, and demotivation often associated with more extrinsic approaches.

Specifically, the framework includes four interlinked domains: purpose, research, communities, and capacity. Here, we provide a normative description of each component, as we would expect it to contribute toward a "healthy" impact culture that generates impact from research with the fewest possible negative unintended consequences for stakeholders and publics, and for researchers and their institutions/funders. A healthy impact culture:

1. Emerges from clear individual and shared purpose;
2. Generates impacts that are based on rigorous, ethical, and action-oriented research;
3. Forms and is lived out by groups of people as they interact with both academic and non-academic communities; and
4. Builds the capacity needed to facilitate the research, community, and priorities that underpin impact.

Based on this conceptual framework, we define impact culture as *communities of people with complementary purpose who have the capacity to use their research to benefit society*.

While our definition and framework are based on insights from the literature, the interpretation, framing, and integration of this evidence was shaped through an iterative process of individual interviews and discussion in workshops over the course of a year, as described in the previous section. This led to the articulation of the four domains under which our review of the literature is arranged in the rest of this section.

Purpose

Clear purpose is the foundation of a healthy impact culture because culture is in large part about meaning making (Ashforth and Pratt, 2003; Mohr et al., 2020). Meaning is a key component of most academic definitions of purpose, which suggest that purpose is found by finding meaning in past, present, and future life experiences (Ryff, 1989), leading to an intention or goals to achieve something that is meaningful and of consequence (Damon et al., 2003; Kosine et al., 2008). Alternatively, McKnight and Kashdan (2009) suggest that purpose is more of a guiding principle or "self-organizing life aim" that organizes goals and behaviors to generate a sense of meaning. This includes the meaning researchers derive from their work, as it is influenced by values, self-identity, and significant others, how this influences motivation, and how the impact agenda has created goal conflicts

for many researchers that have further influenced the meaning, identity, and motivation they derive from work.

Meaning of Work

There is a rich literature on the meaning of work. From the individual, psychological perspective, this ranges from research on beliefs, values, and attitudes toward work (e.g., Nord et al., 1990; Roberson, 1990; Ros et al., 1999) to the subjective experience and significance of work (e.g., Wrzesniewski et al., 2003; de Boeck et al., 2019). From a more sociological perspective, meaning is constructed through social interaction and reflects social norms and shared value systems that ascribe meaning to certain types of work (e.g., Mead, 1934; Kluckhohn and Strodtbeck, 1961; Geertz, 1973). Ultimately, meaning is sense-making, in terms of how a person makes sense of (or understands) something, or perceives its significance, in a given social or some other context (Ashforth and Pratt, 2003; Wrzesniewski et al., 2003).

The meaning that any individual ascribes to work is strongly influenced by their values and self-identity. For example, the Life Framework of Values (O'Connor and Kenter, 2019) can be adapted to show how researchers live *with*, *from*, *in,* and *as part of* their work. This gives rise to the consideration of instrumental values (the value of what researchers can get from work), relational values (how researchers value their relationships in and with work) and intrinsic values (the value of work without reference to any benefits for the researcher). More simply put, Roberson (1990) classifies value orientations as primarily intrinsic vs. extrinsic, and others have applied Schwartz's (2012) "compass" of 10 basic values to consider how a person's values influence the meaning they derive from work.

In addition to the influence of individual values, meaning making, and hence the development of any work culture, is influenced by co-workers, leaders, communities, and family relationships (Rosso et al., 2010). These relationships may provide cues about how to interpret work experiences and derive meaning through an inter-personal sense-making process in which alternative meanings based on different value orientations may be considered (Salancik and Pfeffer, 1978; Wrzesniewski et al., 2003). Social identity theory suggests an alternative mechanism, based on membership and identification with "in-groups" at work that help people establish a clearer sense of self-identity (often in contrast to "out-groups") and purpose as they contribute to others in their work community (Kahn, 1990; Grant, 2007; Grant et al., 2008). Having a sense of belonging to a group can help people find meaning as they experience a common identity, shared fate, or connection with others (Homans, 1958; White, 1959).

Motivation for Work

Meta-analyses have shown a strong relationship between the perceived meaningfulness of work and intrinsic motivation to do work that a person feels matters (Hackman and Oldham, 1976, 1980; Fried and Ferris, 1987). But what "matters" is deeply personal, and is strongly linked to a person's identity or "self-concept," which Rosenberg (1979, p. 7) defines as "the totality of a [person's] thoughts and feelings that have reference to himself as an object", which will change over time in response to different experiences and contexts (Ashforth and Mael, 1989). There is evidence that intrinsic motivation for work is strongly influenced by the perceived alignment between work tasks and a person's self-identity (Pinder, 1984; Deci and Ryan, 1985), especially when the person experiences autonomy and competence as they perform the tasks (Deci and Ryan, 2000), and perceives that they are in control of their own decisions (Rosso et al., 2010). The authenticity of aligning work with perceptions of the "true" self is a key mechanism through which people derive meaning from work (Gecas, 1991), enabling them to maintain and affirm their identity and values while working (Shamir, 1991).

This marries with the perceived loss of autonomy and "academic freedom" described by the largely demotivated respondents to the Wellcome Trust survey (Moran et al., 2020). This is important in the academic sphere because researchers often self-identify strongly with their work, gaining significant levels of self-esteem from their psychological identification with their jobs. As a result, many academics see their work as a "calling" in which they work for fulfillment rather than financial award or advancement, as opposed to having a job (in which meaning is derived from material benefits that can be enjoyed away from work) or career (in which meaning is derived from advancing through an occupational structure, and attaining increased status as well as pay) (see Baumeister, 1991 for more on this tripartite model of work orientation). The perception of work as a calling is typically associated with beliefs that "*work contributes to the greater good and makes the world a better place*" (Rosso et al., 2010, p98), for example, the advancement of the discipline or non-academic impact.

The idea of work as a "calling" has theological roots (Luther, 1520; Calvin, 1574), and although most workers are reluctant to discuss it openly, empirical research has shown that many think of their work in spiritual terms (Davidson and Caddell, 1994; Grant et al., 2004; Sullivan, 2006). Here, we define spiritual as a personal search for meaning or purpose (Tanyi, 2002) typically associated with a connection to something other, larger, more significant, and lasting than the self (Dyson et al., 1997), including a higher power, guiding force or energy, or belief system (Hill and Pargament, 2003). Maslow (1971) described this as "transcendence," and Rosso et al. (2010) referred to it as "interconnection," where individuals supersede their ego to connect with an entity greater than themselves or beyond the material world. In this sense, engaging in research and impact both have the potential to contribute to a "*greater good*" (as Rosso et al., 2010 put it) of lasting significance. If cultures are built through the creation of meaning, it seems important to understand how universities can give researchers the autonomy, capacity, and opportunities to make contributions that will provide this deeper sense of purpose in their work. As such, the transformation of universities to become purpose-driven, rather than being driven by the impact agenda, is an opportunity for universities to enable researchers to find their own purpose as much as it is an opportunity to connect with the purpose of the university or the stakeholders it seeks to serve.

This transition, however, has created a goal conflict between research and impact for many researchers. As the Wellcome

Trust survey showed (Moran et al., 2020), many universities' attempts to transition to a more social mission has compromised the perceived autonomy of researchers, with 74% saying that they thought "*creativity was being stifled due to research being driven by an impact agenda*."

Goal Conflicts

A clear sense of purpose leads to the creation of meaningful goals and behaviors that re-enforce and support that purpose (Damon et al., 2003; Kosine et al., 2008; McKnight and Kashdan, 2009). Therefore, pressures that force researchers to prioritize their time in ways that are not in line with their purpose can lead to significant levels of psychological dissonance and demotivation, and may in some cases compromise well-being (Haradkiewicz and Elliot, 1998; Bronk et al., 2009; Burrow et al., 2010). As such, resolving goal conflicts, such as those identified by the Wellcome Trust survey (Moran et al., 2020) between research and impact is a crucial component of enabling researchers to create a healthy impact culture.

Goal hierarchy theory has been widely applied to goal conflicts (Unsworth et al., 2011), and so is pertinent to the duel challenge of producing both research and impact, faced by researchers who are under increasing pressure to both publish and generate impact from their research. The theory helps explain how purpose emerges from an individual's values and self-identity and is expressed through priorities, ultimately influencing which tasks are completed, and which are postponed or discontinued.

At the top of the goal hierarchy are values (referred to in the theory as "self-goals"). Although often implicit and unspoken, a researcher's values ultimately determine the decisions they make as their values create a domino effect through each of the other goals in the hierarchy. These values inform and shape the researcher's identity (or "principle goals" in the theory). Their identity then informs and shapes their purpose and priorities ("project goals" in the theory) because they want their purpose and priorities to be consistent with their self-identity. Their purpose and priorities then dictate the tasks that are prioritized at the bottom of the goal hierarchy. Psychological dissonance arises when a person has to prioritize tasks that are not aligned with their identity and values, leading to demotivation and disengagement from work. As such, someone who has a strong identity as a researcher, informed by values such as the intrinsic value of knowledge and curiosity, is likely to be demotivated when confronted with impact-related tasks. Similarly, research tasks may demotivate someone who sees themselves primarily as an impactful knowledge broker, based on values that drive empathic connection with those facing real-world challenges.

Goal hierarchy theory suggests two approaches to resolving goal conflicts between research and impact. In the first approach, tasks are ranked on the basis of their alignment with the identity and values of the researcher, and this is used as a justification to drop tasks that align poorly, where this is possible. In reality this is often not practical, so task integration seeks to identify tasks that are aligned with core identities and values, that will also enable the achievement of non-aligned tasks. For example, someone whose primary identity is as a curiosity-driven researcher might co-author more applied papers with stakeholders or draw on impact evaluation data to enhance their applied research, enhancing impact while pursuing research tasks. Alternatively, someone whose primary identity is linked to their impact might extend or complete a stalled paper with some new research that makes the work more relevant to stakeholder needs, or apply for research funding with stakeholders who will benefit if the project is funded.

If culture is created through meaning-making, then it is crucial to understand how engaging with impact can contribute toward or conflict with the identity, values, and purpose of researchers, and their intrinsic motivation. A lack of attention to these deeper issues may explain the demotivation associated with impact in the Wellcome Trust survey (Moran et al., 2020) and negative attitudes held toward the Research Excellence Framework, which assesses the impact of UK research (Weinstein et al., 2021). Indeed, in interviews with researchers in the UK and Australia, where the institutional impact agenda is most advanced (Chubb and Reed, 2017, 2018; Chubb et al., 2017), researchers from less applied disciplines (primarily in the sciences, arts, and humanities) reported feeling judged by their colleagues for doing work that was perceived to be self-indulgent and of little public interest. A university that prioritizes impact may only provide purpose for more applied researchers, whose work is already well-aligned with the impact agenda. To create a more inclusive impact culture, in which all researchers can feel valued and find deeper meaning in their work, it is important to create opportunities for researchers to engage with impact authentically, on their own terms, in ways that are consistent with their unique purpose, identity, and values, and hence build their intrinsic motivation, rather than building yet more extrinsic incentives to push colleagues toward impact.

Research

How we produce research is an intrinsic part of any impact culture that seeks to meet needs and be evidence-based. This includes the ethics and disciplinary-specific notions of rigor that underpin our research and the extent to which research focuses on understanding problems vs. solutions. Although co-production could have fitted under the community theme (in the next section), it is covered here on the basis of literature arguing for Mode 2 research which includes co-production (Nowotny et al., 2003).

Rigorous and Ethical Research

Healthy impact cultures underpin their impacts with rigorous and ethical research. Without relevant safeguards, it is possible for research to have seriously negative impacts, for example as was seen from now discredited research on the link between the MMR vaccine and autism (Wakefield, 1999) or the many highly influential studies from psychology that have failed to be replicated, whose findings are now thought to have arisen from the practice of "data dredging" or "p-hacking," where researchers search large datasets for statistically significant relationships and then retrofit a hypothesis that could explain the finding (Maxwell et al., 2015). The open science movement is now tackling this by creating new norms in many disciplines to pre-publish research

protocols and make data available for others to analyze (Friesike et al., 2015; Vicente-Sáez and Martínez-Fuentes, 2018).

However, it is important to recognize that perceptions of rigor and ethics may vary between researchers and disciplines. Ethical issues may differ between research groups, and even between members of the same group, including many that researchers may be unaware of. For example, female, ethnic minority, vulnerable, or hard-to-reach groups may inadvertently be excluded from social science due to the timing, location, or design of interviews or focus groups (Morgan and Morgan, 1993; Flanagan and Hancock, 2010). There is also growing pressure on researchers to make "policy recommendations" from single studies, whether in response to journal editors and reviewers who want the research to be more widely read (and cited) or funders who want to see impacts from their investment. However, while there is growing recognition that such recommendations should only be made on the basis of evidence synthesis, there are limited incentives from funders or universities to prioritize synthesis work over conducting new original research. More worrying still is evidence that researchers perceive that certain gendered personality traits are better suited to achieving impact, biasing researchers and evaluators toward pursuing 'hard' impacts that can be counted, instead of 'softer', less quantifiable impacts (Chubb and Derrick, 2020). In response to some of these challenges, there is now rich literature on "responsible research and innovation" (Owen et al., 2012; Von Schomberg, 2013). This community advocates for responsible research that is inclusive (for example, of genders, publics, disadvantaged and hard-to-reach groups), open (pre-publishing research protocols, pre-print papers, and data), and responsive (to the needs of those who might benefit from the research, providing them with opportunities to engage throughout the research cycle).

Action-Oriented Research

The second reason we need to consider the research that underpins our impact culture is the tendency to focus on understanding problems rather than researching solutions. We need to shift our focus from amassing more and more knowledge about the problems the world is facing, to devising and testing solutions that might tackle the underlying drivers of the problems we have studied for so long. Often described as "mode 1" research (Nowotny et al., 2003), the majority of the peer-reviewed literature to date has sought to describe the world as it is, with all its problems, by proposing and testing theories that can be generalized to provide universal knowledge that can be applied across many different contexts.

"Mode 2" research pays more attention to the context in which knowledge is generated and applied, and focuses more on the applicability of knowledge in any given context, than its generalizability between contexts (Nowotny et al., 2003; Caniglia et al., 2021). As researchers connect with the contexts in which they do research, they become able to legitimately connect with the people and contested issues in that context, and it becomes increasingly difficult to act as a detached observer. For example, researchers might seek solutions to visible challenges, such as increasing research funding to early career researchers and groups that are more likely to experience discrimination (such as women, researchers from ethnic minorities, and those with disabilities or long-term health conditions). However, it is possible to go beyond this to find solutions to the deeper conceptual and existential issues that are driving the problems we can see at the surface. We need to tackle problems within the underlying systems and structures that perpetuate inequality and discrimination. Some of these solutions need to be conceptual, for example how to transform institutional structures, financial models, and modes of governance in our universities and funding bodies. Or we may focus on the values, beliefs, and norms of those who make and follow the rules that govern our institutions. Other solutions need to tackle existential challenges, for example reconceptualizing what universities are for, and who they are meant to serve.

An interesting example of action research with local communities is Staffordshire University's Creative Communities Unit (CCU), a dedicated public engagement unit which ran from 2002 to 2018 (Gratton, 2020). Their "Get Talking" approach to participatory action research emphasized the use of creative engagement techniques to connect with vulnerable and hard-to-reach groups via "community researchers" who were trained and often paid to work as partners on projects. Community researchers could also enroll on a course to get credit for their work, enabling people who had never engaged in Higher Education before (and probably would never have considered doing so) to gain a qualification. Over time, the Unit built up a large team of community researchers who could work on new projects as they came in. The work was so successful that the CCU started attracting funding from local government and charities to deliver outcomes for the local communities they were serving. Whilst the CCU no longer exists, the Get Talking approach has been adapted for a diverse range of projects. In addition to the contributions of community researchers to the university, there were positive impacts for community members who gained new friends through taking part in events. They established a network that became a lifeline for many when the country then went into lockdown in response to the Coronavirus outbreak.

A similar approach has been taken by a number of projects that have applied to their funders for flexible funding in which there is a pot of money dedicated for use in community projects. Community groups propose projects, and a panel of community members help decide who gets the funding in collaboration with the research team. Impact monitoring might be built into the projects by the researchers, but otherwise there is no formal reporting requirement, enabling community groups to share what they have used the money to do in more creative ways than writing reports. The creativity of the projects that emerge from this sort of approach can be unexpected. For example, the Managing Telecoupled Landscapes project (Zaehringer et al., 2019) built in flexible funding for local project partners to generate impact based on evidence arising from the research. For each of the three countries they worked in, Laos, Madagascar, and Myanmar, they had a budget of 50,000 CHF to fund two "implementation actions" per country. In Madagascar they organized a workshop with stakeholders from the vanilla sector and discussed how the revenues generated through vanilla trade could be steered toward more sustainable regional development.

As part of this, they developed a film that integrated the voices of different vanilla stakeholders. At the same time, they implemented an agricultural diversification scheme, training young farmers from different villages to facilitate farmer-to-farmer knowledge exchange and innovation. Building on this, they then were able to attract funding from a private donor, through which other individuals and groups of farmers can now apply for funding for forest-friendly development projects.

More radical than this however are the Ownership, Control, Access, and Possession (OCAP) principles which are used by a range of indigenous populations around the world (including First Nations communities in North America, Métis, and Inuit communities) to ensure research is not exploitative (Schnarch, 2004). In some of these communities, researchers who want to work with local communities have to agree to the OCAP principles before they can work through the organizations representing the community. This means that indigenous communities control data collection processes themselves, and they own, protect, and control how their information is used. They, not the researchers, have the final say in any decision about how and by whom the research data are collected, used, or shared. At the end of your 3 year project, if the community you worked with decide they do not want you to publish your research, they have the power to block publication. This option is important given the extractive nature of many research practices this community had previously been exposed to. In reality, this is rare however, unless the necessary steps of relationship building and trust had not been established, and the research did not respond to their stated needs. While co-production can be described as a way of doing research and delivering impact, it is clearly also about trust and relationship building, and so in the next section, ways of building community with stakeholders is explored in greater depth.

Community

There are three elements of community that may significantly influence impact culture: trust, connection, and the role of social norms and power. Taken together, these represent the "social capital" that an individual, team, or institution has with those they need to work with to generate impact (Bachmann, 2001; Rust et al., 2020).

Trust

Cairney and Wellstead (2020) define trust simply as, "a belief in the reliability of other people, organizations, or processes" as their actions affect the person who is trusting (after Gambetta, 1988). The perceived trustworthiness of researchers depends on their integrity (or honesty), credibility (the feasibility and evidential basis of their claims), and competence (or ability) (Cairney and Wellstead, 2020). The role of cognitive biases should not be underestimated in the formation of these perceptions, as people use heuristic shortcuts, including both evidence-based and potentially prejudicial assessments, to evaluate the trustworthiness of others they do not know, based on prior experience (Kahneman and Tversky, 2013). Trust is necessary for research impact because it enables people to co-operate without the need for contracts, non-disclosure agreements and, other cumbersome arrangements, reducing complexity and facilitating efficient collaboration. Trust can exist between individuals and between institutions, and to understand trust, it is necessary to look both ways, from the perspective of each party to the relationship (Luhmann, 1979; Zucker, 1986).

Public trust in research was put to the test during the recent COVID crisis. Although it can be difficult to disentangle public trust in research vs. the governments who are implementing scientific advice, it is clear that public trust in the scientific basis for COVID precautions differs significantly around the world. For example, in Saudi Arabia there is evidence of public trust in both government pandemic policy and its scientific basis (Almutairi et al., 2020), while trust has been low in the Democratic Republic of Congo (Whembolua and Tshiswaka, 2020). Kreps and Kriner (2020) found evidence that US researchers who downplayed uncertainty gained public and political support for their recommendations in the short term, but later contradictory studies or reversals in projections reduced trust in research over the longer term. Agley (2020) showed that US public trust in science about COVID was influenced by factors such as religious and political orientation.

This is, of course, the latest in a long line of issues that have tested public trust in research. For example, in a European Commission (1997) survey, 26% of citizens identified environmental organizations when asked whom they trusted most to tell the truth about genetically modified crops, compared to just 6% who named universities (and 1% and 4% who named industry and national public authorities, respectively). The earthquake and tsunami that triggered Japan's 2011 nuclear accident shook Japanese public trust in science, as researchers were viewed as endorsing defensive government narratives on the accident (Arimoto and Sato, 2012). In the UK, controversies surrounding bovine spongiform encephalopathy during the 1990s prompted public criticism of the role of scientific advice in policy-making, leading to the formulation of rules for science-based policy-making by the government (UK Government Office for Science, 2010, 2011). Other guides have been produced by governments around the world in an attempt to strengthen public trust in research, and the role of research evidence in policy-making (e.g., Berlin-Brandenburgische Akademie der Wissenschaften, 2008 in Germany, Commission of the European Communities, 2002, and Government of Japan, 2011).

To retain and build public trust in research(ers), Wilson et al. (2017) suggested 10 strategies: be transparent; develop protocols and procedures; build credibility; be proactive; put the public first; collaborate with stakeholders; be consistent; educate stakeholders and the public; build your reputation; and keep your promises. Similarly, McAllister (1995) argues that interpersonal trust depends on perceiving someone as competent, reciprocal, fair, reliable, responsible, and dependable. It is possible to trust a researcher or institution on one issue for which they are deemed competent but not on other issues, where they do not have the same track record. However, by following guidelines such as those proposed by Wilson et al. (2017), it may be possible for researchers and their institutions to systematically build trust with publics and key stakeholders over time.

Trust is an important precondition for many impacts because we know that people are more likely to act on evidence they receive via trusted individuals and networks (Carolan, 2006; de Vries et al., 2015; Taylor and Van Grieken, 2015). This effect is more pronounced when there is risk or uncertainty (O'Brien, 2001), complexity (Luhmann, 1979), or credibility issues (Ingram et al., 2016) associated with the evidence or the actions being proposed. Knowledge is exchanged more frequently and freely among networks of people who trust each other, while the presence of just one person in the network who is perceived to be untrustworthy can instantly shut down group communication (Lyon, 2000; Levin and Cross, 2004; Stobard, 2004). Indeed, de Vente et al. (2016) showed that having senior decision-makers in the room (in this case policy-makers) was more likely to deliver decisions that were implemented on the ground, but discussion, learning, and trust building were much more significant when these people were not in the room.

The temporal dynamics of trust are worth noting. Trust typically forms slowly over many small steps, and so the first step toward building trust with someone is to engage with them, and give each other low-risk opportunities to give and take, and see what happens (Rust et al., 2020). It is this reciprocity that builds trust over time. Once a trusting relationship has been established, we continue to perform acts of trust and trustworthiness in the day-to-day give and take of our relationship (de Vries et al., 2015). When trust is broken, it often happens in an instant, and can take far longer to rebuild than it took to build in the first place (Lewicki et al., 1998; Lewicki and Tomlinson, 2003).

Connection

Despite the clear link between reciprocity and trust building, the majority of researchers invest little time in reciprocal relationships beyond their disciplinary networks. This remains one of the most powerful ways researchers can build trusting, impactful relationships beyond the academy. Using stakeholder analysis (Reed et al., 2009; Kendall and Reed, in preparation), it is possible to identify individuals, groups, and organizations that might benefit from engaging with research, and starting with these connections, small beneficial acts can initiate the process of reciprocity that builds trust over time. Many supposedly "serendipitous" impacts arise from this process of "being in the right place at the right time" as researchers build their non-academic networks, and become more visible and accessible to those looking for help. Such networking activities can build three types of connection, which can each play a different role in promoting impact (Pretty and Ward, 2001; Pretty, 2003; Rust et al., 2020):

1. Researchers build "bonding" connections when they invest in relationships with people who are similar to them, typically sharing similar interests and attitudes. While this might typically refer to institutional and disciplinary networks, it is possible to create bonding capital within diverse communities of interest;
2. Researchers can take on the role of "bridging" connections if they are able to build trusting relationships with key individuals in very different networks who would not normally interact with each other, e.g., Neumann (2021) and Reed et al. (2020) showed how researchers played particularly important bridging roles between members of the research, business, charity, and policy communities in UK and German peatland governance bodies.
3. "Linking" or "bracing" connectors create connections between different hierarchical levels within a network, for example between policy-makers and farmers, or connecting postdocs with senior managers so they can make their views heard, e.g., Reed et al. (2018) showed how ClimateXChange and the IUCN UK Peatland Programme played a role as the boundary organizations in Scotland that connected decision-makers in the policy community with the voice of practitioners as well as researchers.

Social Norms and Power

These connections are in turn influenced by social norms, which establish expectations within a community or network around modes of interaction and behavior. Norms around reciprocity have been shown to be important for collaborative work and can help rapidly build trust, increasing the likelihood that members of a community will offer help to each other, in the knowledge that others will provide help if and when they need it (Ashby et al., 1998; Gómez-Limón et al., 2014). However, more negative norms can exist, for example a highly critical group norm may stifle innovation among members who are worried that the group will be quick to judge their actions (Rust et al., 2020).

Norms are often shaped (or imposed) by the most powerful members of a group, who may be invested in protecting the status quo that has given them power (Gelderblom, 2018). Those with power in a group may determine who is included or excluded from a group or its activities, in turn influencing the extent to which others in the group can connect or build trust (Lyon, 2000). Groups with strong power imbalances can make it hard for members to trust each other because trusting someone often means exposing vulnerabilities, which may be exploited to further entrench power dynamics (Bourdieu, 1986; Blackshaw and Long, 2005). Such exploitation of power may lead to imbalances in the level of resources, opportunities and information that different members of the group are given, further perpetuating the imbalance of power. Where power is used to control information, knowledge exchange can be used to disempower others, restricting who has access to the most valuable knowledge within an "inner circle" (Foucault, 1980; Brugnach and Ingram, 2012). However, it may also be used to empower others, where processes are developed to ensure transparent access to information and decision-making processes for all members of a group (Fazey et al., 2013). Instead of abusing their position of power, it is of course possible for leaders to sanction abuses of power and organize groups in ways that flatten power dynamics arising from existing hierarchies and other privileges.

A healthy impact culture is underpinned by social norms that seek to actively empower the voiceless and marginalized, and enable active participation from across all members of the groups and networks researchers participate in. This requires deliberate work and effort to understand the causes of marginalization and

how these root causes might be addressed, in order to empower active engagement, rather than just doing better outreach (Bell and Reed, 2021). It also involves looking hard at the reasons why research and researchers are so inaccessible to most stakeholders, beyond just addressing issues of open access to research findings. Researchers themselves may be as hard to reach as some of the stakeholders classified as "hard to reach."

This process may in some cases be bruising, and as a result many researchers focus on those who are easier to reach, partly as a protective strategy and partly because the time invested in more receptive audiences are likely to yield more impact. It is important to recognize the vulnerability of researchers who may have had psychologically damaging interactions with stakeholders in the past or who do not have the time or desire to prioritize impact. Others in teams or departments might then prioritize impact without putting undue pressure on all researchers to be equally active in their engagement with stakeholders.

As such, building a community with stakeholders may be seen as a collective endeavor across an institution, rather than each researcher having to obtain (or protect) their own networks. While some researchers will be rightly protective of certain important relationships, it is possible for the collective social capital of a group of researchers to enable the kinds of coproduction discussed earlier in this paper.

Capacity

There needs to be sufficient capacity to build each of the three pillars of a healthy impact culture described in the previous sections, including: skills, resources, leadership, strategic, and learning capacity.

Skills

A number of skills may be needed to realize impact. Most universities now have in-house impact training, run by a combination of local and external experts, and some also provide coaching alongside a more personalized, longer-term portfolio of skills development tailored to the needs and interests of the researcher. Where possible, a more tailored and personalized approach can enable researchers to develop skills that match their priorities and enhance their motivation for impact. Training in responsible research and innovation and strong induction processes are essential to ensure all researchers have the same basic understanding of rigor and ethics to underpin their work (see the section Research). Given the importance of building non-academic social capital (see the section on Community), training in influencing strategies, workshop facilitation, stakeholder analysis, and communications are core skills for researchers who want to generate impact from their work. Training in impact planning tools, such as logic models (Rush and Ogborne, 1991; Julian, 1997; see Reed et al., 2018 for an example of a research impact logic model) and Theory of Change (Quinn, 1988), impact monitoring and evaluation methods (e.g., Jancey et al., 2020; Louder et al., 2021; Reed et al., 2021a), and an understanding of the various settings within which impact may be generated, for example skills and strategies for working with policy vs. industry, is also important (e.g., Reed et al., 2018). Training may also focus directly on impact culture, for example integrating insights and tools from across the three components described in the previous sections, or training in the cultivation of compassion (see Poorkavoos, 2016 for examples of a diagnostic questionnaire and training courses).

Funding

Training requires funding, and internal funding for impact staff and initiatives is an important part of the capacity that is needed to facilitate a healthy impact culture. For example, Peart and Jowett (2017) described how they used an institution-wide impact assessment to justify investment in the generation and evidencing of impact in the lead up to the UK's 2021 Research Excellence Framework, transforming their impact team from 1.5 to 10 full time equivalents in the space of 2 years. An alternative approach is to seek external funding, for example for large strategic investments as a university or collectively with other universities around specific challenges or sectors to create boundary organizations (see the section on Connection).

Another approach is to allow researchers to bid for internal impact funds to support their impact. However, there is a danger that applications and awards may be biased toward certain groups of people (e.g., men over women) or types of impact (Chubb and Derrick, 2020). For example, "hard" impacts with high potential for significance and reach may be prioritized over "soft" (Chubb and Derrick, 2020) or "unsung" impacts that may be important but are harder to measure, are significant but not far-reaching, benefit the "wrong people" at the "wrong" time or place (according to impact assessment criteria), or are based on research that is contested, confidential, or does not meet eligibility criteria for impact assessment (Reed, 2019).

As a result, it may be worth considering how such funds can be prioritized in a transparent way to fund impacts that are particularly important or in need of help, allocating funding to those who need it most, rather than those who shout loudest. Some universities hold back impact funds specifically for early career researchers to ensure that this group gets some of the funding for impact, even if the impacts they are pursuing might take longer to yield measurable benefits than more mature impacts that senior staff have been building for years.

Learning Capacity

Learning capacity is sometimes overlooked in institutional capacity building for impact. Monitoring and evaluation of impacts are important to facilitate learning from mistakes as well as providing evidence to support case studies of impacts that have been successfully achieved (Louder et al., 2021; Reed et al., 2021a). Universities are increasingly investing in impact tracking systems, whether as add-ons to existing research management systems or more sophisticated systems developed specifically for tracking impact, like Vertigo Ventures' Impact Tracker and ResearchFish (Fedorciow and Bayley, 2014; Hill, 2016; McKenna, 2021). However, academic engagement is limited unless it is mandated by funders, even with the most sophisticated and user-friendly of the systems currently available.

It can also be valuable to engage with stakeholders in the design and implementation of monitoring and evaluation to

ensure the outcomes evaluated actually meet their needs. If impact can only ever be defined in relation to the people and contexts you seek to benefit (Reed, 2021), then the only legitimate way to evaluate impact is through the eyes of the beneficiaries. In addition to encouraging researchers to monitor impacts as they arise, it may also be useful to create safe spaces in which researchers can learn from each other, including learning from mistakes, for example via seminars' series and workshops (Wenger-Trayner and Wenger-Trayner, 2020).

Strategic Capacity

Strategic capacity for impact may take the form of an impact plan (e.g., via a logic model or Theory of Change) for individual research projects (see above), but more extensive strategies are typically needed at institutional scales. Broadly speaking, there are two types of institutional impact strategies (Reed et al., 2021b). First, "achieving impact" strategies had a strong emphasis on partnerships and engagement, but were more likely to target specific beneficiaries with structured implementation plans, enable the organization to operate as a boundary organization to co-produce research and impact, support and facilitate best practice at the scale of individual research projects or teams, and recognize impact with less reliance on extrinsic incentives. Second, "enabling impact" strategies tended to be developed by universities and research institutes to build impact capacity and culture across an institution, faculty or center. They also had a strong focus on partnerships and engagement, often including a focus on industry or local communities, and they invested in dedicated impact teams and academic impact roles supported by extrinsic incentives including promotion criteria.

Leadership Capacity

Finally, effective leadership is needed to build a healthy impact culture. While this is traditionally considered in terms of senior management roles, the literature on evolutionary organizations (Duening, 1997) and socio-technical systems (Geels, 2004) suggests that a more bottom-up approach to leadership can yield greater innovation and impact if safe spaces can be created with sufficient intellectual freedom and authority for colleagues to lead with new ideas. Rather than waiting for change to happen from the top-down, colleagues are empowered to lead their own change by being given the ability to experiment and then evaluate and share what they find with others. The approach is evolutionary in the sense that it enables "survival of the fittest" ideas, with weaker ideas being discontinued or adapted and refined in successive iterations. Good ideas and practices that take root in a safe, protected "niche" then have the potential to take root elsewhere in the organization or sector as others see the benefits and adopt the approach for themselves (Geels, 2004). As Rohr (2011) put it, "the best criticism of the bad is the practice of the better."

Synthesis

While each of the four components reviewed in this section–purpose, research, community, and capacity–are important in their own right, any individual component alone will not create a healthy impact culture. For example, many research institutions prioritize the kind of research we have suggested is needed to underpin a healthy impact culture. While this might feed into a strong sense of purpose for many researchers and for the institution, it is likely that opportunities for impact will be missed and negative unintended consequences may arise without the necessary capacity for generating impact and without building social capital with stakeholder communities, while paying attention to social norms and power.

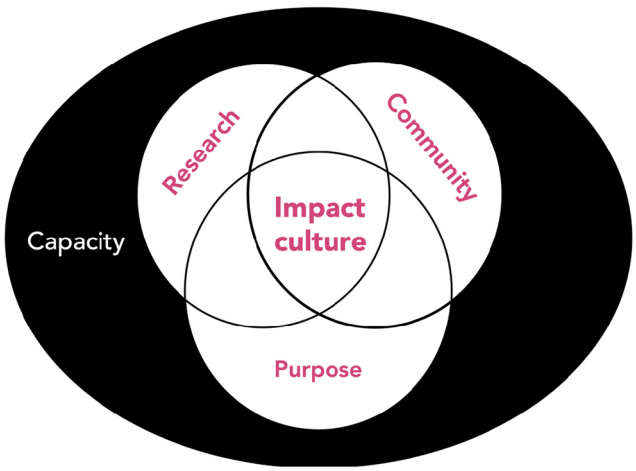

FIGURE 1 | Conceptual framework showing how impact culture emerges at the intersection between: the purpose of an individual or institution; rigorous, ethical, and action-orientated research; and social capital between academic and non-academic communities, in the context of sufficient internal capacity to facilitate each of the three pillars of a healthy impact culture (from Reed, 2021).

Instead, our framework shows that a healthy impact culture emerges at the intersection between research, community, and purpose, enabled by sufficient capacity (**Figure 1**). The overlapping circles in the Venn diagram visualize how purpose shapes choices about which research questions are asked, how research is conducted, and to what end, whether to further understand the problem or research potential solutions. Equally, the rigor, ethics, and (typically) unpredictable outcomes of research will have a significant bearing on the purposes that can be achieved by any researcher. Second, the purpose of research can significantly shape relationships with peers and stakeholders, either underpinning or undermining trust and connection, for example depending on whether the purpose is theoretical or applied, problem- or solution-oriented, or competitive or collaborative. Equally, interactions with peers and stakeholders can significantly shape the purpose of researchers, as they are influenced, inspired, or challenged through these collisions. Third, engaging with peers and stakeholders can significantly enhance the quality and relevance of research and enable research to deliver more meaningful impacts. Equally, collaborating with diverse peers and co-producing impact with stakeholders can deliver original insights that also meet felt needs and priorities.

DISCUSSION: WHAT NEEDS TO HAPPEN?

Moving to a healthy impact culture requires two things. Crucially, responsibility for each lies with both researchers as individuals and the institutions that employ them:

1. Researchers must each do the inner work of tackling the barriers that prevent them from being more authentic and pursuing their purpose. In turn, universities need to create the space, academic freedom, and capacity to enable researchers to pursue priorities linked to this purpose; and
2. Universities need to reinvent themselves as boundary organizations that connect researchers across disciplines (not just within their own institution), and systematically connect researchers, publics, and stakeholders around key challenges. In turn, researchers need to open their minds to the opportunities that this creates, finding ways of engaging with these opportunities that connect with their own identity, values, and purpose.

This needs to happen at three quite different scales. First, there is the individual scale, where researchers find new ways of seeing themselves and their contribution to the world which emerge as researchers own their own intrinsic motives, identities, and values, and express their purpose through their research, and the role they play in their communities.

Second, when these individuals come together in groups, emergent properties arise at the group level, which go beyond the sum of the individual contributions to the group. When groups of increasingly authentic colleagues connect around shared purpose, it becomes possible to explore new ways of working and to achieve research and impact goals together that would not have been possible otherwise. Rather than homogenizing action around a single university mission statement or set of values, different groups can legitimately pull in different directions. A university that prizes academic freedom cannot build its operations on the model of an army squadron or a business where everyone has to conform to a single mission or set of corporate values. We must not only allow but encourage diversity, enabling multiple sub-cultures to develop and flourish in parallel, at different speeds and with very different outcomes.

Third, when a university empowers individuals and groups to build their own sub-cultures, adapted to their unique circumstances, there are emergent properties at the scale of the university itself, which can no longer be pigeonholed as one thing or another, that is for "them" or "us." It spins out companies and builds the local economy, and at the same time, it critiques the capitalist model and exposes and tears down structures that exploit the vulnerable. One research group might engage in activism to defeat the objectives of organizations that other researchers are trying to help. Rather than seeing this as self-defeating however, it is possible to see this as innately healthy if we see impact as both "*perceptible and/or demonstrable benefits…that are causally linked to research*" (Reed et al., 2021a, p. 3). As we went on to explain, "*impact is in the eye of the beholder; a benefit perceived by one group at one time and place may be perceived as harmful or damaging by another group at the same or another time or place*" (Reed et al., 2021a, p. 2). It is not for us, but for those we seek to help, to judge if what we have done is "impact."

If we want to move toward the kind of impact culture proposed in our framework (**Figure 1**), we need to make three major shifts in our thinking. First, we need to move from counting the quantity of our outputs to weighing the quality of our thinking. It is important that we do not assume that everyone has the same ethical grounding and capacity we expect, ensuring all new researchers are given a basic training in ethics, open research, and evidence synthesis. The university may also have a role to play in creating spaces where people from different disciplines can have creative collisions between research disciplines and interests.

Second, we need to move from ignoring and compounding, to *tackling* the deep causes of demotivation. In so doing, our goal is to move our colleagues from being disengaged and stressed, to feeling engaged and inspired. We need to create the head-room and academic freedom for people to find and be themselves. And where necessary, we need to provide support for colleagues to do this inner work. Occupational health is good at providing physical and psychological care when things have gone wrong, but research institutions tend to be reactive rather than proactive in preventing mental and physical health problems, and more could be done to provide coaching and help early on to build emotional and physical resilience.

Third, if we want to move toward a healthier impact culture, we need to transform our view of the role that universities play in society. We need to move from seeing the university and researchers as knowledge generation machines, to recast researchers as knowledge brokers and universities as boundary organizations. We need to move from studying problems with objective distance, to researching solutions in collaboration with those who are looking for answers. This means we need to move from consultation and participation toward ways of engaging as equals with our colleagues outside the university, facilitating deliberation and co-production. To do this, we need to seek out and build social capital on purpose with those we might be able to help beyond the academy. We need to systematically connect researchers with issues and people that will inspire them to get interested in new questions that they can research together with the people who need answers. In doing so, we need to move toward a more co-productive and participatory research culture.

These three shifts in thinking require a balance between inward-looking initiatives to strengthen academic and disciplinary networks and more outward-looking activities to build social capital with the non-academic community (see the section on Community). They also require a balance between collective action and personal agency, based on the identity, values, and purpose of the individual and the institution (see the section on Research). **Figure 2** visualizes this as two axes, which can be used to characterize four types of impact culture:

- **Corporate impact culture:** A large number of research institutions are currently creating impact culture from the top-down through the creation of institutional impact strategies

FIGURE 2 | Impact culture typology showing four types of impact culture arising from inward vs. outward looking approaches to community building and institutional vs. individualistic approaches to identity, values, and purpose around impact.

(Reed et al., 2021b). Although these often have significant buy-in from key stakeholders, for example around the co-creation of boundary organizations, they tend to be capacity-oriented rather than goal-oriented and focus on institutional strategy. While the corporate approach can lead to social identification and belonging around impact for some, it may lead to disidentification and loss of autonomy for others whose identity, values, and purpose do not accord strongly with key institutional impact initiatives (Rosso et al., 2010);

- **Research "and impact" culture:** The other common approach relegates impact to an afterthought in an institutional research strategy, either as a rationale or justification for research, or as an end (or by)-product of research, with limited development of specific impact goals or capacity, which tends to be aspirational, with limited active engagement or input from stakeholders. This can still result in social identification and belonging around research as a priority within the institution (Rosso et al., 2010), but is unlikely to facilitate communities of practice around impact (Wenger-Trayner and Wenger-Trayner, 2020);
- **Individualistic impact culture:** By empowering researchers to take their own approach to impact, it is possible to build individual autonomy, confidence and intellectual freedom with limited need for institutional co-ordination (Rosso et al., 2010). However, impacts are likely to arise as a secondary consideration from research, in consultative rather than collaborative or co-productive mode with stakeholders (Reed et al., 2018);
- **Co-productive impact culture:** This approach also fosters individual autonomy, confidence, and intellectual freedom and requires limited institutional co-ordination. However, in contrast to more individualistic cultures, specific impact goals are co-produced through active relationship and dialogue with stakeholders as a primary consideration in research.

Rather than viewing impact culture as developing through a sequence of stages, as suggested by Rickards et al. (2020), we propose that any one of the four types of impact culture proposed in **Figure 2** may characterize different organizational units or groupings of researchers within the same institution at any given time. For example, it is possible for an individual research group or center to have a strong individualistic or co-productive impact culture within an institution that promotes a corporate or research "and impact" culture, which may dominate how other groups within the same institution operate. Impact culture may shift over time between any of the four types, depending on the extent to which groups within the organization focus on building social capital with academic vs. non-academic networks and promote individual agency vs. collective action.

CONCLUSION

This paper has proposed a definition, conceptual framework, and typology for research impact culture. While many of the principles may apply outside research settings, to organizations that seek to generate benefits for others in society, a *research* impact culture must be rooted in effective and ethical research, and we argue that healthy impact cultures promote action-oriented research. Our framework is normative, underpinned explicitly by the individual and shared identities, values, and purpose of researchers who create meaning together as they generate impact from their work.

However, the framework is not prescriptive in the identities, values, or purpose that can or should underpin these impacts. Instead, we emphasize the need for individuals and institutions to consider how their current identities, values, and purpose are aligned with the impacts they wish to see in the world. Where individuals and institutions are not achieving impact, instead of designing additional extrinsic incentives to push behaviors toward generating impact, we urge a more introspective (self-)compassionate, and empathic approach, in which we examine the values and identities that shape the purpose and day-to-day priorities of universities and individual researchers. Only in this way are we likely to address the deeper, existential challenges facing universities, reconceptualizing what they are for, and who they are meant to serve. In institutions that prize academic freedom, such introspection on an individual level might in some cases cause researchers to re-evaluate values, identities, and assumptions that were previously implicit, enabling an explicit refashioning of their role in the world that may enable them to prioritize the kinds of actions that might address global challenges. In other cases, by making their values, identities, and purpose explicit, it may be possible to reframe impact as a way of authentically expressing the curiosity, creativity, integrity, and other values and identities that intrinsically motivate researchers, whilst generating benefits for others.

In this way, it is possible for multiple communities of researchers to emerge who share complimentary identities, values, and purpose, which may conflict with those of other groups within the same institution. Instead of developing an institutional mission and set of values to which all researchers are expected to subscribe, we argue that intellectual freedom must understand, respect, and value differences in ontology, epistemology, values, beliefs, and norms. Instead of striving for a unified, unitary impact culture, multiple impact sub-cultures should be able to flourish, even if their goals are mutually exclusive. These communities can and should be porous and dynamic, enabling mixed communities of researchers and stakeholders to work together on different projects, as their needs and interests intersect. Rather than waiting for this to happen, it may be necessary to more proactively build social capital beyond the academy, paying attention to trust, connection, and the role of social norms and power, for example through the co-creation of boundary organizations. Finally, these three foundations of a healthy impact culture (research, purpose, and community) need to be enabled with sufficient capacity, including skills, resources, leadership, strategic, and learning capacity.

Based on this, we argue for a bottom-up transformation of research culture, moving away from the top-down strategies and plans of corporate impact cultures, toward transformation that is driven by researchers and stakeholders themselves in more co-productive impact cultures (**Figure 2**). Responsibility for this change lies with individuals, but must also be held by institutions to create academic freedom and capacity for researchers to pursue priorities linked to their purpose more authentically. To enable this, universities may need to re-invent themselves as boundary organizations in which researchers can pursue these priorities with publics and stakeholders around twenty first century challenges.

AUTHOR CONTRIBUTIONS

MR: conceptualization, methodology, formal analysis, writing—original draft, writing—review and editing, visualization, and project administration. IF: writing—original draft and writing—review and editing. Both authors contributed to the article and approved the submitted version.

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The remaining author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.