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Putting missions in their place: Micro missions and the role of universities in delivering challenge-led innovation

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Abstract

We draw on first-hand experience and empirical evidence to address current concerns that the mission approach carries too much emphasis on technological innovation and top-down state-led action. We identify the concept of smaller-scale ‘micro missions’ that address place-based challenges. In so doing, we show a role for universities that extends beyond the entrepreneurial triple helix and demonstrate how a mission approach can be effective beyond an emphasis exclusively on science and technology and economic outcomes. We highlight universities as safe, convening spaces and their role in bringing together local actors in designing and delivering a micro missions approach.

Keywords

Universities, Place, Micro missions, Public services, Innovation

JEL

R11, R58, O31, O38

1. Introduction

Mission-oriented innovation (a ‘missions’ approach) has been widely discussed in the literature as a potential solution to the grand challenges associated with social, economic and environmental problems (Janssen et al., 2021; Mazzucato, 2021; Schot & Steinmueller, 2018). In providing a novel agenda for socio-economic development through innovation policy, the missions literature has explored empirically and prescriptively how large, system-level changes and goals can be achieved by establishing visions, and steering innovation in a particular direction (Kattel & Mazzucato, 2018; Schot & Steinmueller, 2018). To date the emphasis has been on missions that are underpinned by, and produce, technological innovation and sector development (Foray, 2018). But addressing societal challenges is likely to be far more complex than that of purely technology-based missions for all the reasons suggested in *The Moon and the Ghetto* by Richard Nelson (2011).

Yet if missions-oriented innovation is to deliver the promises of its advocates, a more holistic and multiscalar approach is likely to be needed. Among other things, the potential for sub-national and smaller scale missions may need to be developed. While the possibilities of such missions have begun to be explored (Bours et al., 2021; Tödtling et al., 2021; Wanzenböck & Frenken, 2020) there is little consensus about the actors and processes involved in implementing them. In this paper we seek to contribute by exploring how smaller scale, micro missions may be designed and implemented in a way that addresses these place-based challenges. This represents an important empirical and policy issue given the growing interest in the missions approach at the sub-national level. We focus our attention on the role of universities in such micro missions, a role that has remained underdeveloped in the wider missions literature. There are reasons, however, why universities might be able to play a more important role in place-based micro missions. They have long been identified as important actors in regional innovation systems and economic development (Tripl et al., 2015; Uyarra, 2010); but have been seen as largely focused on entrepreneurial models of support for spin-outs and knowledge transfer (Marques et al., 2019; Pugh et al., 2016). While there are increasing calls for universities to play a fuller role in social and ecological innovation at the heart of many grand challenges, their precise role is unclear (Benneworth & Cunha, 2015; Cinar & Benneworth, 2021). Yet if mission-oriented

innovation is to be extended beyond the state-led and top-down approach, universities have a potentially significant role, particularly at sub-national levels.

In this paper, we explore the role of universities in localised, bottom-up approaches to missions. In doing so, we introduce the concept of the ‘micro mission’, which we define as missions created to address specific place-based issues at sub-national scales. We argue that such missions require broader forms of innovation than typically harnessed in science and technology missions, and have the potential to address social, economic and ecological challenges faced by local citizens and those at the forefront of such challenges. They may also be able to contribute towards multiscale challenges and contribute to larger regional and national goals. While micro missions may allow for a more spatially targeted and decentralised approach, concerns have been raised more generally about the potential for regions to develop such missions (Brown, 2021; Tödtling et al., 2021). Here, successive iterations of regional innovation policy has provided limited evidence of impacts over time and space (Edler et al., 2013), with implementation identified as particular challenges for many regions (Uyarra & Flanagan, 2016). The new generation of place-based innovation policy in the EU – Partnerships for Regional Innovation – has already embraced the concept of small-scale missions in local areas as multi-stakeholder partnerships designed to address ‘territorial challenges with the aim of achieving impacts within established time frames’ (Pontikakis et al., 2022: 5). The motivation of this paper is therefore to explore how smaller scale, micro missions may be designed and implemented in a way that addresses these place-based challenges.

We provide early first-hand experience and action research evidence of the role that universities might be able to play in mission design and delivery in line with both recent theoretical advancements on the importance of the sub-national level and the emerging critique of missions. In doing so we argue that, while missions need to be conceived in multiscale terms, universities can play a role at the sub-national level, working with regional partners to trial and test place-based experiments, and in doing so benefit from localised knowledge, lower set up costs and collaborative working arrangements among partners who know each other well (Wanzenböck & Frenken, 2020). Such a role for universities in more localised endeavours means they are particularly well placed to

contribute towards 'micro missions'. In light of the potential role for universities to engage in these processes, our paper addresses three main research questions. First, how can micro missions be designed and delivered? Second, how can missions be framed spatially? And third, what are the roles for universities and regional partners? We consider these in the light of an ongoing example of a university acting in partnership with local actors to design and develop skills in a mission approach to innovation.

We illustrate our ideas with reference to a novel regional policy taking place in Wales, comprising two related initiatives designed to embed and support challenge-led missions and activity across the region: *The Cardiff Capital Region Challenge Fund (CCR CF)* and the *Innovative Future Services project (Infuse)* seek to embrace both the practical development and delivery of a challenge fund alongside the necessary investment in development of capabilities, backed by policy action to help the approach to gain traction in the region. Our findings suggest how localised knowledge can be brought to bear on practical challenges faced by actors, with the university acting in partnership with the Cardiff Capital Region as a catalyst for change and providing a safe incubation space outside of traditional organisational boundaries, for public and private sector actors to work together to explore potential solutions. This engagement of universities and other local actors within cities and regions points to the need for research to reflect the regional and place-based settings within which missions are created, providing a much greater spatial sensibility to research in this area. We conclude by identifying limitations of the study, areas for future research on both micro missions and the role of universities, and policy implications.

2. Literature review

2.1 Missions as place-based innovation

The burgeoning interest in mission-oriented innovation policy forms part of a wider reappraisal of regional innovation studies, away from economic and structural analysis of regional development towards a wider 'normative' lens encompassing the socio-ecological dimension of innovation (Coenen et al., 2015; Uyarra et al., 2019; Weber & Rohracher, 2012). This has focused attention not only on innovation as a generic process, but also on its

directionality, legitimacy and responsibility (Edler & Fagerberg, 2017; Janssen et al., 2021; Mowery et al., 2010). Such missions reflect a largely top-down focus on science, technology and innovation projects such as the Manhattan project, Apollo and Concorde (Mowery et al., 2010) and have highlighted the importance of big science, centralised control and multiple sectors and sources of expertise, in achieving technological objectives (Foray et al., 2012).

Along with an emphasis on technology, governance of missions has typically been framed at the national level (See Mazzucato, 2018). While this may be relevant to grand societal challenges, it has underplayed the role for smaller scale, micro missions to be conceived and implemented at the subnational level. In this respect, greater bottom-up engagement in localised contexts offers the potential both for responsiveness and for multiscale approaches to missions to be developed that address societal grand challenges in a place sensitive manner (Pontikakis et al., 2022). The importance of the spatial scale of missions has been the subject of recent calls for decisions to be taken as closely as possible to citizens (Wanzenböck & Frenken, 2020). More widely others have highlighted place-based innovation policy as offering the basis for taking better account of local characteristics and capabilities and adopting a long term approach to tackling challenges (Barca et al., 2012; Hassink, 2020). In contrast to spatially neutral (or blind) policies, a place based approach highlights the importance of local context and its 'social, cultural and institutional characteristics' and local knowledge in the policy development process (Barca et al., 2012). Challenges facing missions have, however, been raised by scholars, arguing that they represent a 'fuzzy' policy that fails to provide 'comprehensive and detailed mechanisms for their operational deployment' and not always aligned to their demand context (Brown, 2021: 756).

The premise of missions has also faced more fundamental criticism from mainstream innovation scholars who argue that the mission-oriented innovation policy approach advocated by Mazzucato and others suffers from three overarching weaknesses: 'First, we do not know how to pick them or operationalize them. Second, we do not know how to evaluate their successes and failures, and it is likely that we will never be able to do so in a satisfactory way, since the opportunity costs are incredibly complex. Third, it is difficult to

make an actual flesh-and-blood person accountable, which greatly increases the risk that an unproductive, or even destructive, project is initiated, as well as supported past its due date' (Larsson, 2022: 89). Although these criticisms are not without merit, they seem to be driven primarily by an ideological aversion to the state having a more prominent role in the design and delivery of innovation projects. But as we noted in the introduction, the missions approach need not be framed in a top-down fashion in which the central state is the dominant actor in the process. The 'new industrial policy' approach developed by Rodrik and the 'experimentalist governance' approach advocated by Sabel both suggest that the state can be part of a pluralistic group of actors that are jointly engaged in a process of economic self-discovery to overcome the informational deficits that can otherwise stymie innovation and development (Morgan & Marques, 2019). A greater spatial sensibility can also help to frame the missions approach in more pluralistic terms because it aims to put missions in their sub-national place, be it a city or a region, where there is arguably more scope for place-focused collaboration around a more granular agenda that facilitates the operationalisation of mission-based activity.

Adopting a greater place-based approach to innovation missions raises the question of how to manage the increased complexity that may emerge from smaller missions. Bours et al. (2021), for example, examine how mission projects may be able to self-organise at the local level. They argue that a small wins strategy in this context could benefit from synergies across multiple small wins to 'propel' solutions, and to do so in a way that limits potential contestation from incumbent solutions and actors (Bours et al., 2021). Indeed, the anchoring of micro missions in local places may have further benefits in terms of local knowledge and support for small-scale mission processes. We therefore seek to extend research on sub national missions by exploring the potential for purposive action to design and implement micro missions in local places.

Although attention to the place-based nature of missions highlights the potential for solutions to respond to the everyday needs and aspirations of citizens and businesses, the capabilities of local actors to engage and manage missions is unclear. In this respect all places are not the same, indeed the capacity of actors to engage in missions in some places may also be limited, presenting both challenges of coordination and implementation

(Brown, 2021; Marques & Morgan, 2021; Tödtling et al., 2021). Others, however, point to alternative assets such as industrial, natural, human, infrastructural, and material assets that may form the basis for regional missions (Tödtling et al., 2021: 7). That is, different forms of innovation and unheralded actors may be able to coalesce around place-based missions (Coenen et al., 2015; Tödtling et al., 2021; Trippel et al., 2020). These combinations are potentially more likely when a more capacious and less technology-focused approach is adopted.

The implications of this are that we need a much better understanding of the ways in which different actors may come together to address these place-based missions. The next section turns to this challenge and examines the potential role that universities may be able to play in such place-based missions. Universities are increasingly faced with the challenge of addressing social and ecological problems in their region (Cinar & Benneworth, 2021) and may be able to engage in a more direct way in mission-oriented innovation than hitherto recognised.

2.2 Universities, missions and place-based development

While knowledge creation and human capital development have been the primary objectives of universities for many years (particularly research-intensive universities), they have been increasingly viewed as agents of commercialisation and economic development (Pugh, 2017; Uyarra, 2010). This has seen universities identified as important actors in regional innovation systems (Trippel et al., 2015), with research highlighting the drive for universities to adopt a more entrepreneurial approach to their role in the regional economy, as reflected in concepts such as the Triple Helix (Etzkowitz, 2012; Gunasekara, 2006; Pugh, 2017). Universities are widely recognised as key actors in these regions, but current approaches still tend to treat them as reactive ‘black-box’ institutions, failing to acknowledge both their heterogeneity and uneven strategic capacities (Goddard & Vallance, 2013; Kohoutek et al., 2017; Pinheiro et al., 2012). While the precise role of universities as place-based actors may be somewhat ambiguous, with researchers’ careers governed by the national and international reach of their research (Uyarra, 2010) and the tendency for research-led institutions to collaborate externally (Power & Malmberg, 2008), they are

being challenged to ‘move from a space-blind approach to the idea that place-responsiveness is an important feature of the modern HEI’ (Kempton et al., 2021: 1).

Typical interlocutors of universities in the entrepreneurial model of university-industry interaction include science, technology and innovation firms, often from the manufacturing sector (Huggins & Johnston, 2009). This entrepreneurial model, emphasises science and technology interactions as comprising support for entrepreneurship, spin-outs, and knowledge transfer (Pugh et al., 2016). Yet focusing on traditional forms and metrics of innovation does not reflect the diversity of roles played in the region, as a supplier of expert knowledge to regional governance and strategic processes (Benneworth et al., 2017; Fonseca & Nieth, 2021; Raagmaa & Keerberg, 2017; Uyarra, 2010). It may also underplay the challenges faced in university place-based collaboration (Kempton et al., 2021; Vallance et al., 2020). Here, research has identified internally focused challenges associated with the teaching and research excellence objectives of many universities, the limited incentives for researchers to both engage with, and difficulties for firms to access expertise (Goddard & Vallance, 2011; Kempton et al., 2021; Lach & Schankerman, 2008). Research has also identified contextual challenges that may limit the potential for such engagement, including limited focus of research and teaching on local industrial challenges and needs, weaknesses in firm absorptive capacity and fragmented regional innovation system (Huggins & Kitagawa, 2012; Trippi et al., 2015). Such problems may be particularly acute in less developed regions and left behind places (Marques et al., 2019), and can limit the potential for such regions to engage in commercialisation activities, but also wider developmental roles (Gunasekara, 2006).

Despite the recognised challenges for universities to engage in place-based collaboration they have been increasingly called on to respond to grand challenges and different forms of innovation, such as social and ecological innovation (Cinar & Benneworth, 2021; Goddard et al., 2012). While engaging with a broader range of social and ecological mission agendas is unlikely to be straightforward for many institutions (Cinar & Benneworth, 2021; Kempton et al., 2021) there are reasons to believe that university roles in missions could be developed. They represent anchors in particular places with a broad range of expertise (in social science and humanities as well as science and technology) and may be able to act as a ‘broker’ in

providing collaborative experimental spaces that could be brought to bear on social innovation activities such as urban demonstrator projects (Benneworth & Cunha, 2015; Tewdwr-Jones & Wilson, 2022; Vallance et al., 2020). As key actors within local areas universities have knowledge and expertise, as well as the potential of bringing together academics, policy makers and practitioners in inter-disciplinary research groupings to co-produce knowledge that addresses societal grand challenges and mission-like processes. Indeed, universities may be well placed to provide such experimental spaces given their perceived independence of formal policy processes (Vallance et al., 2019).

3. The research case and method

The research draws on a case study of the CCR CF. CCR forms part of a £1.28 billion City Deal agreed with UK and Welsh Governments. Created in 2013, CCR comprises ten local authority partners across South East Wales, with two cities – Cardiff and Newport – and some 1.5 million inhabitants. While its objectives are those of traditional forms of economic development – GVA uplift, additional investment and jobs – its approach seeks to marry together economic and social objectives in its portfolio of projects. In this respect, CCR’s approach recognises the potential for innovation in the tradeable sector but also public sector and the wider foundational economy. As its Director, Kellie Beirne, put it ‘In CCR we invest in [the] ability of public sector to create/shape markets, to be a co-investor and take risk for reward’ (Beirne, 2022).

The case study research comprises two aspects of CCR’s micro mission approach to innovation: *Infuse* – integrated support to build innovation capacity in public services, and the *CCR CF* – a public sector challenge programme to co-create solutions to societal and economic challenges faced by CCR. In both cases the research builds on participation of researchers from Cardiff University’s Centre for Innovation Policy Research and Y Labⁱ in the initial discussions around the creation of a public services test-bed (Ashelford, 2017), and subsequent design and implementation of these projects alongside CCR and public and private sector partners between 2018 and 2022. The empirical evidence reported draws on the authors’ own participation in both the design and delivery of these mission activities, complemented by analysis of a range of secondary data sources such as CCR corporate

documentation, participation in challenge events including the bid review process for challenge projects (tracheotomy, sustainable food, and decarbonisation challenges), plus interviews with key informants undertaken by the first author (14 – see Supplementary information). While the first author brings a detached perspective to the data, the second and third authors of this paper have played a central role in the conception, creation and now implementation of the two case projects working closely with the CCR and colleagues in Y Lab and Nesta. In this regard, the project may be seen as ‘action research’ since the researchers are both active in shaping the micro-mission approach and in researching the initiative, its processes and outcomes. Action research is a well-established methodology, particularly in the social sciences (Reason & Bradbury, 2012) and has been used to good effect in researching and delivering regional innovation policy (for example, Larrea & Estensoro, 2021). Here we draw on the first-hand experience of the second and third authors based on their involvement throughout the period of development and delivery of the initiatives reported.

4. Place-based micro missions in the Cardiff City Region

The creation of the CCR in 2013 represented a new era of collaboration amongst its ten municipalities. It drew on the incentives provided at the UK level for the creation of City Deals (Waite & Morgan, 2018) and sought to develop a negotiated approach to place-based development in the City Region, with one member one vote (Morgan & Henderson, 2023). City Deals form part of the growing devolution agenda in the UK, with the introduction of ‘a new form of urban governance and infrastructure investment based upon negotiated central–local government agreements on decentralised powers, responsibilities and resources’ (O'Brien & Pike, 2018: 1448). They constitute a selective transfer of funding and responsibilities to deliver against UK government priorities and to engender competition between places (O'Brien & Pike, 2015). Such policies have particular implications for Wales, where Welsh Government has led on social and economic policy agendas since its creation in 1999, with the UK sponsored City Deals presenting the potential for conflict between different ‘devolution narratives’ (Waite & Morgan, 2018).

CCR has established three priorities for its Economic Growth Plan, with ‘Challenges’ representing one of these priorities (along with Infrastructure and Innovation). This activity is focused on challenges that shape places, market creation, IP commercialisation and responses to regional priorities. An innovative feature of its investment strategy is its commitment to long-term staged investment (so-called ‘evergreen’ investmentⁱⁱ) and co-investment principles that ‘recognise that risks must be taken to drive the CCR’s objectives’, while addressing disparities (Cardiff Capital Region, 2019: 2).

CCR’s approach to challenges recognises the value of a mission approach which places social and economic development goals on a more equitable footing than has hitherto been the case in traditional regional development policy. This starts from an entrepreneurial position of wishing ‘to have a go rather than fail by omission’ (Beirne, 2022), and the belief that a focus on social challenges and equity within the city region can ultimately produce the outcomes by which it will be judged. It would be wrong, however, to view these initiatives as being divorced from Welsh Government. Welsh Government represented an important funding partner in several initiatives, and whose Wellbeing of Future Generations of Wales Act (Welsh Government, 2015) provides a prism through which the University and the City Region’s municipalities are addressing the needs of citizens and places.

Municipalities represent unheralded actors within the regional innovation system and archetypal place-based actors (Morgan, 2019). Public services, however, are increasingly viewed as a possible source of place-based social and ecological innovation (Morgan, 2019). The mission framing of CCR’s strategy highlights how such municipalities may be able to engage in supporting social innovation and place-based issues. The role of Cardiff University as proponents of mission-oriented innovation and place-based development should also not be underestimated in the initial formulation of the approach. While traditionally associated with national and international research (as a Russell Groupⁱⁱⁱ member), its Vice Chancellor has advocated a stronger role for the University in place-based innovation, viewing the University as a core partner in the ‘Cardiff University innovation ecosystem’ and actively promoting the development of translational research and facilities to support innovative engagement of research in the City Region (Riordan, 2018). This was developed in parallel with new strategic commitments to innovation and engagement that emerged around the

period of the Vice Chancellor's appointment, that saw the University take a more active role within its local community.

The CCR CF was launched in 2020 and is a three and a half year, £10m fund aimed at building local wealth and creating jobs through the development of innovative solutions to societal challenges that are proposed by public sector organisations ('Challenge owners') in the City Region. Designed and managed in a partnership between the University and the CCR, it draws on emerging thinking and practices in addressing societal challenges, including the Nesta Challenge Prize, SBRI (The Small Business Research Initiative), and the work of mission-oriented innovation theorists (Interviews 1-6 and 12). The novelty of its approach within a City Deal context, however, required the CCR to justify its approach within the narrow constraints of the City Deal (GVA, jobs and investment leverage) to a sceptical UK Treasury (Cardiff Capital Region Cabinet, 2020). This required a delicate balance to be made between these economic metrics with the potential for challenges to address social and economic problems:

'GVA, jobs and private leverage are the key objectives most frequently associated with City and Growth Deals. Challenge funds still deliver on these – but intentionally don't start out with the answer, the amount or a specific project. Instead, they start with data and a problem statement. Through exploration, the answer, solution or project is arrived at. The process drives innovation and unlocks added value for both the problem owner and problem solver(s)...The focus of the proposed programme is to re-build local economies for a post-Covid world, through solving societal challenges that have economic impact and potential commercial-scale opportunities' (Cardiff Capital Region Cabinet, 2020: 5).

In practice this commitment has meant that CCR is unable to fund challenges that deliver only on purely social or ecological issues. Such issues are in scope but must be addressed in ways that also provide market opportunities for the innovative 'solution providers'. While challenges may be developed by individual local authorities, the rationale for the CCR CF is to identify public services innovation that may be scalable within the region and beyond. As one CCR CF partner put it: 'we represent the body of ten local authorities, whereby the vast majority of the problems or challenges that they face are exactly the same.'(I4)

The CCR CF's approach is thus one that incorporates support for the development of innovative solutions to societal challenges with the intention of providing a route to market for the solution. Its approach, however, is distinct to large scale challenge-led innovation approaches in its focus on place-based challenges at a more granular level. As one partner noted:

'I think there's a danger that we think so big...in big societal challenges and big complex problems, it kind of scares people off in a way. Really big investments in solutions...that's just part of the role, but I think the (CCR CF) projects are actually bringing it down to, a regional and subregional level, and looking at what problems there are, even down to the community level. (I1)

In practical terms the university team, which comprises both research and administrative staff, is the delivery partner for the CF working closely with the CCR challenges team. This has meant working very closely with the CCR in the development of bespoke processes and documentation, the communication of funding opportunities, the hosting of events and workshops, identifying potential challenges and the supporting the development of proposals, evaluating these proposals and overseeing the delivery of individual challenges. In addition, the university team provides ongoing research expertise in support of challenges and project selection and has led on the development of a 'community of practice' in the region centred on challenge-oriented innovation. The senior academics are part of a strategic board which has overall responsibility for the CF. This role is part of the academics' wider leadership roles in establishing the university's approach to place-based innovation and development.

Despite the role of the university in providing a convening space, with administrative and research support the challenges themselves were identified and led by public sector organisations in the CCR – working with the CCR and university team – and involved collaboration with local partners. To support this process the university acted as a convenor, providing virtual and physical spaces to foster discussion between public sector challenge 'owners' and solution providers, with each project intended to deliver place-based public benefits. This role, in many cases, is one that will cease as 'owners' work with solution providers, although in some instances ongoing links will see academics provide additional

research and expertise, at the request of projects. The value of the university in this process was described by one municipal participant:

...So for us, academia offers rigour, which we probably haven't come across in public service often. It offers legitimacy, you know, in specialisms. It has also pushed us, pushes our thinking.... it's a different level of thinking that we in public service desperately need.' (I4)

This role, however, did not extend to a lead role in the subsequent challenges – a role that was taken by the challenge holder, with varying or limited subsequent involvement by the university in areas such as contributing to innovation proposal evaluation and supporting events.

The Fund's first project addressed the challenge of providing clinical training for tracheostomy procedures during the Covid-19 pandemic. The challenge was led by Cardiff and Vale University Health Board in partnership with other health boards and an SBRI approach was adopted and delivered in partnership with the Welsh Government's SBRI Centre of Excellence^{iv} (15). Two innovative proposals, both drawing on the novel use of virtual reality and immersive technologies, were funded through the development of marketable products that are currently being trialled in hospitals in both Wales and England with the likely outcomes benefitting both the challenge owners in the region (the University Health Boards in the CCR) and the solution providers (businesses, one of which is based in the region). Further challenges, relating to the sustainable production and supply of food are under development^v, alongside early-stage plans for a social care challenge, were launched in the later period of the research.

The CCR CF was established to both deliver challenge-oriented innovation and also to build capacity and capability for such an approach within the CCR. This has involved an extensive programme of workshops and events to engage local actors across the public, private and third sectors and the gradual nurturing of a 'community of practice' in the region. However, the most extensive aspect of this activity is undertaken by its 'sister' project Infuse, with its complementary focus on building capacity for innovation in the public sector. The *Infuse project* is a three-year, £5.6 million partnership, involving a local authority (Monmouthshire

County Council), Nesta and Cardiff University. It is focused on addressing two challenge areas of Accelerating Decarbonisation and Supportive Communities – both of which have been identified as being important to the Cardiff Capital Region. It operates through a series of six-week interactive learning ‘Labs’ delivered by university research staff to local authority officers from the City Region. This includes: an *Adaption Lab* to enable participants to work together to understand how to adopt or adapt innovations to their organisation’s needs. The *Data Lab* provides tools to enable participants to make use of data to inform decision making. The *Procurement Lab* focuses on helping participants to maximise the value when commissioning or purchasing goods and services. In each Lab the University and Nesta provide tools and techniques that participants are able to take back to their organisations to support public services innovation. Project support for the legitimacy of such public service activities is also developed through regular meetings between the Infuse participant and their chief executive, giving ‘each participant...one hour a month to ‘reverse mentor’ their senior leader [helping] to embed the learning and get high level buy-in to any innovation that they bring forward and to embed it’ (I4).

It is anticipated that building innovation capacity in the municipal partners may provide the basis for local places to benefit from these skills alongside the potential for subsequent applications to the CCR CF, thus supporting the mission objectives of the partners. These Labs also highlight the convening role of the University, providing both a space in which public partners could meet to engage in processes to incubate and develop and test ideas, often collectively^{vi}. This convening role represented more than that of a simple hosting of activities and provision of research. Instead, it was supplemented by the recruitment of a team of researchers (overseen by senior academics) to support mission capacity development and the process of ‘reverse mentoring’. Together role helped to provide, what one participant, described as a safe space for innovation skills development:

‘I think two big things happen that allow it to become a safe space. Probably three, actually. So the first is that you get senior management buy-in for them to be part of the programme. So senior management commits to them being able to get....cover from middle management. The second is that they're committed to doing this for two days a week. So they have time. And then the third is the we're here to help and we have quite a big team of people who are there to help them negotiate the anxiety that can exist around uncertainty in innovation.’ (I3)

The project expects to support some 120 local government officials, with all ten local authorities in CCR participating to date.

It is important to note that several practical challenges for both CCR CF and Infuse were evident with regard to engaging public sector actors in the challenge approach during the study period (2020 to 2022). Capacity deficits were evident in the difficulties that public sector bodies had in providing time and resources to develop challenge proposals; a problem compounded by the demands of the Covid-19 pandemic budgetary pressures (I2), and evident more generally across the public sector in Wales (Jones, 2022). While the support of specialist 'mission' support bodies such as the SBRI Centre for Excellence (to advise on, and contribute to, the management of missions) and Innovate UK KTN (to promote missions to private sector innovators) were able to alleviate such deficits (I5, I13), capability deficits were manifest with challenge-oriented innovation skills and knowledge being in short supply (I1, I3, I5). Such capacity deficits could also stretch beyond participants in Infuse and CCR CF to their wider organisations with respect to absorbing and acting upon mission ideas. As one interviewee put it:

'They probably get good buy-in at senior level, but then when officers go back to their day job...at officer / middle management slash officer level, it's much more difficult to push innovation and to get other people to understand why behaviour change is a good thing, and how they could benefit'. (I7)

In parallel to practical organisational challenges, political challenges were also evident, not least in the difficulties associated with implementation in the context of the multilevel polity in Wales. This was a feature of the experimental governance underpinning the mission-oriented activities, which recognised the difficulties of retaining the loyalty and solidarity of CCR municipalities, whilst building new regional institutions to catalyse innovation, alongside the national level, where Welsh Government was nervous about the rapid pace of change in CCR and the latter's direct links with Central Government in London (Cardiff Capital Region Cabinet, 2020)

Although it is too soon to draw definitive conclusions about Infuse or the CCR CF, the results to date illustrate the potential benefits of viewing universities as actors to convene place-based mission activities. This provides important innovation opportunities for public services, which may otherwise be absent. As one local authority interviewee argued, when reflecting on the benefits of Infuse participation: ‘we are trying to run services under budget, with spiraling need and complexity...we just don't spend enough time in that proactive space, which in my experience for 25 years in public sector is really important’ (I4). Moreover, by seeking to nurture public services innovation and collaboration they not only build capacity, but also raise awareness about the potential for joint action through resource pooling. This potential for scaling solutions to challenges within the region points to the importance of ensuring good practices from particular places are diffused in the wider region and beyond. This represents an ongoing challenge (and opportunity) for CCR but also for Welsh Government.

5. Policy implications

The mission approach has largely been conceived as a national level responsibility, with an emphasis on science and technological challenges and excellence (Mowery et al., 2010). In this section our aim is to draw out policy implications for smaller scale, place-based approaches and the potential for regional policy makers, but also municipalities, business and civil society to engage in such processes. In doing this we acknowledge the potential problems for regions noted in previous research, namely capacity and coordination (Brown, 2021; Tödtling et al., 2021). These challenges may be heightened at the local level where municipalities in Wales and the wider UK have been subject to a sustained period of austerity, impacting on their ability to engage in innovation activities (Morgan, 2019). The approach highlighted in the case evidence, however, suggests micro missions offer the potential for policy makers to add to, and complement, grand challenges. We consider the policy implications for missions in three main areas: objectives, participants and capacities:

5.1 Micro mission objectives:

While missions have traditionally been conceived as addressing global grand challenges through excellence, science and technology the findings of this research are that policy

makers may be able to harness micro missions to address a much broader palette of social and ecological forms of innovation. Such challenges, while having, global relevance, are experienced by local areas particularly, and most acutely by their citizens (Coenen & Morgan, 2020). This means that there is greater potential for policy makers to explore solutions that are meaningful to local areas and to draw on local knowledge in addressing localised challenges has the potential for gaining a greater degree of local input and support for mission activities. These objectives may also be typically shorter than traditional missions and draw on extant sources of knowledge as well as leading edge innovations.

5.2 Micro mission partners:

The evidence presented in this paper highlights the importance of policy makers working in partnership with local place-based partners as a way of overcoming the limitations of individual action in micro missions. Such an approach offers the possibility of sharing expertise and working across organisational boundaries to achieve place-based objectives. Drawing together multiple actors from different sectors can also help to bringing different types of expertise to bear on mission challenges, beyond that of the usual suspects (e.g. innovative firms). Universities may have a particular role to play here as sources of expertise at the regional level and an emerging interest in social challenges (Benneworth & Cunha, 2015; Cinar & Benneworth, 2021). Engaging through micro missions may also offer benefits for universities, helping them to signal their openness for mission partners and providing spaces for businesses and civil society organisations to work together to develop solutions. This role is a far cry from conceptions of the entrepreneurial university and traditional objectives for research and commercial exploitation.

5.3 Micro mission skills and capacities:

Mission skills and capacities represent recognised challenges for mission participants (McLaren & Kattel, 2022), and may be a particular issue in less developed regions with limited innovation activities (Morgan, 2019). This lack of capacity may be faced in both the design but also the implementation of missions. Here the research highlights the potential role of the university to work with the public sector to develop mission thinking and skills for micro missions. It also suggests a model of working for universities to provide a neutral space in which public actors can develop mission skills as well as potential projects.

Universities may also be able to play a role in supporting the public sector to establish and implement missions. Such actions provide the possibility of building public sector mission skills for the future but will also require universities to be suitably resourced.

Finally, the findings suggest that micro mission activities should not be viewed by policy makers as 'silver bullets' to place-based innovation challenges and are likely to need policy makers to consider other forms of support at the regional level. It will also require them to consider the question of scale up, for those missions that produce successful outcomes. Here this scale-up challenge may require collaboration and input from multilevel governance and industry to ensure that micro and grand challenges are integrated. A more modest, but no less important challenge for policy makers is one of disseminating good practices from micro missions within a region including others facing similar place-based challenges.

6. Discussion and conclusion

In this paper we provide first-hand evidence as to how missions might be designed and delivered in line with both recent theoretical advancements on the importance of the sub-national level and the emerging critique of missions. In particular, we examine the issues in designing and delivering a mission approach that may be mobilised effectively at the subnational level. The opportunities for universities to play a role in these processes are revealed through our case study of challenge-led instruments in Wales. We contribute to the emerging policy debates by making three main arguments.

First, we contribute to the growing discussion about the spatial scale and content of missions by arguing that they should be viewed as multiscalar activities in which national missions can be complemented by localised, place-based missions (e.g. UK Government and Welsh Government funding alongside City Deals with university, local authority and business collaboration and support for mission activities). While much attention has been given to grand societal challenges, the activities examined in our research highlight the role of micro missions to address place-based challenges. Although this may create tensions between different mission activities and multiscalar objectives (e.g. the tensions between economic

and social outcomes), it presents opportunities for linkages to be developed between innovation policies that support mission outcomes. A focus on *place* in such micro missions provides for a more inclusive range of actors to engage in missions in solving the challenges faced by local communities. That is, they can draw together less celebrated actors (e.g. municipalities and healthcare providers) that have a stake in the effective solutions to localised challenges (Wanzenböck & Frenken, 2020). The findings further illustrate how mechanisms such as Infuse can be designed to help to develop linkages between public services innovators, and support participants with advice from public service innovators (e.g. the Infuse Alumni network), offering the potential for ongoing collaborative learning to develop around micro missions at the local level. The spatial framing of missions as place-based activities in this research does not detract from the need for national and international science and technology focused ‘grand’ missions – which are vital in addressing societal challenges at scale. Instead, our findings highlight the potential for such micro missions to be complementary to mission approaches being developed at other spatial scales.

Second, we highlight a new role for universities in providing a convening space for such micro missions, in which it can provide spaces for actors to come together to both build capacity and support the generation of micro missions. This role represents a more facilitative role than one traditionally associated with the entrepreneurial university, and one that has been identified in research on the university’s role in establishing demonstrator projects with quadruple helix partners in the North East of England (Tewdwr-Jones & Wilson, 2022; Vallance et al., 2019, 2020). While the convening role highlighted in this research shares similarities with that of other contributions to the literature (e.g. the role of the university in providing spaces for experimental innovation), our findings suggest that the convening role is one that emphasises the university’s openness to engagement individual projects. That is, it addresses the traditional challenge of signalling access routes into university expertise and resources (Goddard & Vallance, 2011). In this respect the convening role of the university may not require it to play a lead role in subsequent mission activities. Indeed, such an approach may respect the expertise of partners (e.g. public sector and businesses taking the lead on implementing missions), as well as their potential to legitimise challenges and solutions within their communities. Development of mission skills

represents a further element of the convening role, highlighting the potential for such roles to sustain mission practices in the region over time. This convening role for universities, however, is not one that is based exclusively on goodwill, with external funding (from CCR) necessary to resource such activities. Moreover we do not assume that the convening role of universities, alone, is the 'silver bullet' to regional innovation policy (Kempton, 2019: 2262), and recognise that a less muscular approach to supporting place-based innovation may be a way for universities to engage with partners in mission processes. This, of course, requires the incentives and institutional support for such a role to be present, as illustrated in the case results, and may not be the case in other regions.

Third, our findings illustrate the capacity challenges associated with place-based micro missions at the subnational level. While such challenges have been identified in the literature (Brown, 2021; McLaren & Kattel, 2022; Tödtling et al., 2021), the case studies highlight capacity challenges in both *mission design* and *mission implementation*. Here the findings highlight how mechanisms can be developed to support the capacity of public sector organisations to identify and develop mission ideas. Infuse, for example, provides support for public sector participants to develop mission skills and ideas in a safe space alongside other municipal participants (facilitating joint actions). Alongside this support, the university CCR CF team has run a series of events and workshops, created a web-based portal and led the creation of a local community of practice to build capacity in the region. The Infuse case further illustrates how these mission design skills processes can be supplemented by activity to support the legitimacy and implementation of micro mission activity within public service organisations (e.g. the reverse mentoring process). Both CCR CF and Infuse further highlight how regions may be able to develop a multiactor approach to support micro missions. Despite the potential for these capacity building mechanisms, our findings point to more prosaic, but no less important, deficits in the availability of public servants to make sufficient time to engage in these processes.

Limitations are present with respect to the early-stage nature of these innovation activities. Here, further empirical research could usefully explore the nature of impacts from micro missions over time, and respond to calls for richer 'policy histories' in regional innovation research (Uyarra & Flanagan, 2022). Indeed, such longitudinal studies have much to offer in

addressing what may be long term challenges, by offering greater opportunities to conceptualise micro missions, as well as the pre-conditions and challenges of scaling up solutions. The focus of this study has been on a research-intensive institution and its potential for micro missions. The rationale, actors and nature of such micro missions in other models of university engagement - such as vocational institutions - may provide a further area for researchers to interrogate the potential of such missions (Kohoutek et al., 2017). As an individual case-study of a single region, further empirical research is needed on how micro mission processes in different regional settings may operate, as well as comparative research. The interactions between place-based micro missions and national / international missions for innovation, as well as other mainstream innovation policy instruments, is an area where research may be able to illuminate the mechanisms and the multiscale nature of micro missions. Similarly, the growing focus on actors and strategic agency in both universities and wider place-based actors within regional innovation systems (Benneworth et al., 2017; Grillitsch & Sotarauta, 2019) represents an additional area where future research could cast light not merely on the constellations of actors involved but also on the permutations of power and control that can determine the outcomes of place-based micro missions.

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^{iv} Y Lab is a public services innovation lab originally established by Cardiff University and Nesta in 2015 and now wholly operated by the University (<https://ylab.wales/index.php/who-we-are/our-story>)

ⁱⁱ Whereby investments are recycled back into the CCR’s main funds on maturity. <https://www.business-live.co.uk/economic-development/plans-100m-cardiff-capital-region-19960913>

ⁱⁱⁱ The Russell Group is the representative body for the UK’s ‘research-intensive, world-class universities’. See <https://russellgroup.ac.uk/about/>

^{iv} A provider of services to support the design and implementation of missions in the Welsh health and social care sector (<https://sbriwales.co.uk/>) (Accessed 6th January 2023)

^v <https://www.challengefund.wales/news/the-sustainable-production-supply-of-food-challenge-is-now-open-for-applications/> (Accessed 6th January 2023)

^{vi} See, for example, <https://www.monmouthshire.gov.uk/infuse/mapping-the-ccr/> (accessed 6th January 2023)