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From consensus to conflict in the regional policy mix for broadband deployment: examining the role of informal coordination

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Abstract

This paper examines the policy mix for broadband infrastructure deployment, and asks what role is there for coordination agents. While research has begun to examine coordination of policy, analysis has largely focused on organization and structures. This paper seeks to develop this further by examining the informal role that coordination actors play in managing synergies and tensions in the policy mix. The research highlights shared synergies in policy objectives for broadband deployment at multiple levels of governance – EU, UK, regional and local authority. Tensions, however, are found in the deployment process at the regional level, as broadband policy objectives interact with those for highways and planning agendas. In seeking to manage these tensions it highlights three coordination roles – champion, troubleshooter and monitor - and shows how these help to address conflicts and tensions that emerge. While the research suggests such tensions are impossible to fully eliminate, the findings show how the work of these informal actors helps to mediate their effects and support the deployment of broadband. These findings are drawn from an in-depth study of broadband policy in Wales between 2012 and 2017, including interviews with the policy community, analysis of news articles and review of policy documentation.

1. Introduction

Regions, firms and individuals are experiencing the consequences of the rapid digitalisation of the economy and society. Such trends are expressed in growing adoption of high speed broadband[1] infrastructure, and use of digital devices and technologies by individuals and organizations. Policy makers and practitioners have watched these trends with interest and have been active in seeking to design policy responses to facilitate the deployment of broadband networks (OECD, 2008; OECD, 2017). This has seen regions seeking to augment private sector infrastructure investments with subsidies and support to ensure greater deployment, including support for take-up and use. Here, the focus of policy has been framed as a mechanism to help regions avoid being left behind in the move towards the digital economy, and to prevent digital divides amongst business and individuals.

Regional scholars have long explored the role and impacts of new digital telecommunications infrastructure (Gillespie and Williams, 1988; Graham, 1992; Tranos, 2012; Tranos and Mack, 2015: , Grubesic and Mack, 2016). This body of research has highlighted the role of such technologies in converging time and space, but noting that access is not experienced uniformly across all regions and sub-regions. Yet, while this literature has provided insight into the important enabling role played by such infrastructure in supporting socio-economic development, comparatively little attention has been given to the policy process itself, with the majority of contributions examining individual programme models and policy outputs (Dabinett, 2001; Gillespie et al., 2001; Huggins and Izushi, 2002; Gillett et al., 2004).

Elsewhere the concept of policy mix has been developed by the innovation policy and mainstream policy literatures to capture interaction between policies as they seek to achieve a particular objective (Howlett and Rayner, 2007; Flanagan et al., 2011). This has been found to be particularly evident at the regional level, reflecting the multi-level governance structures (Magro and Wilson, 2013; Matti et al., 2016; Uyarra et al., 2016; Caloffi and Mariani, 2017). Yet, despite the growth of interest in the policy mix concept there remains a focus on the organizational features and formal interactions associated with the regional policy mix, with limited attention given to understanding the underpinning processes of policy development. This paper seeks to cast light on these interactions by examining the role of agency and coordination in mediating synergies and tensions in broadband deployment policy. Based on evidence from a case-study of broadband deployment policy in Wales (UK) the findings situate the locus of coordination activity in the implementation stages of broadband policies at the regional level, introduce different informal coordination roles played by policy actors, and highlight how mediation is supported by negotiation and discursive practices at the regional and local levels.

The paper begins by briefly reviewing what is known about policy mixes, before moving on to examine the literature on coordination action to mediate tensions (2). Section 3 introduces the research case of Wales – a region that exhibits the complexity of governance levels and policy instruments in support of broadband deployment. The results are then presented in Section 4, highlighting the high level policy consensus about the need to support deployment of broadband across the region, but with conflicts in its implementation. The paper concludes with a discussion of the main findings (Section 5) and conclusions (Section 6).

2. Policy mixes, interdependencies and coordination

The concept of the policy mix was first developed in economics, and subsequently expanded to include mainstream policy studies and other policy-focused disciplines (Flanagan et al., 2011). While there has been some examples of ICT studies using the policy mix concept (see Hanna et al., 1995; Poel and Kool, 2009), these have not considered such mixes at the regional level. The literature on policy mix draws attention to the composition of policies as they contribute towards a particular aim, and analyses their interdependencies. Policies, it is argued, are rarely introduced into a vacuum, and instead interact with others across a number of levels of policy such as objectives, instruments and targets.

The multi-level nature of the policy mix highlights the complexity of creating consistent policy mixes (Flanagan et al., 2011; Magro and Wilson, 2013; Magro et al., 2014). This complexity has been identified in terms of multiple levels of governance, with policy responsibilities ranging from supranational bodies, to national, regional and local government bodies. For regional policy makers this introduces the potential for policy arrangements to develop far from the region, based on differing goals and governance arrangements, with this complexity challenging the potential for mixes to be managed effectively (Matti et al., 2016).

Policy interactions can produce tensions, trade-offs and synergies, and have been found in a wide range of policy domains and studies. Such interactions can occur not only between one policy and another in a single domain (a policy issue or area), but between policy domains, particularly where they share similar or related policy objectives. In this respect interdependencies are said to have both vertical and horizontal aspects (Howlett and Rayner, 2007; Del Río, 2014). While policies and instruments may be well aligned, and characterized by synergies, the mix may require policy makers to negotiate, compromise and make trade-offs over policy instruments and goals (Del Río, 2014).

The growing interest of regional and innovation scholars on policy mix interactions has seen research examine the role of coordination to manage complexity, synergies and tensions (Braun, 2008a; Magro et al., 2014). While there is no agreed definition of coordination in the wider literature, a number of dimensions have been identified. Painter (1981: p. 275), for example, defines it as '*involv[ing] the resolution of conflicts arising from overlaps, the search for priorities between policies and the injection where appropriate of broader perspectives on the narrower sectoral views of the partisans of different policies'*. Elsewhere, Alexander (1993) adds to this by characterising it as '*a deliberate activity undertaken by an organization or inter-organizational system to concert the decisions or actions of their subunits or constituent organizations*'. Despite this lack of an agreed definition scholars are in agreement that there is no 'ready-made technology' available to solve coordination challenges (Boston, 1992: p. 100).

Coordination research draws attention to conflicts and tensions between different policy areas and their consequences such as redundancy (overlap), gaps between policies and incapability without agreement (Peters, 1998b). Some researchers, for example, focus on coordination as an end state for policies, while others see it as an interactive process, with policy makers seeking to learn about how tensions can be mitigated. In managing complexity and

coordination different forms of governance have been identified, ranging from strong central control over subordinate bodies (Chisholm, 1989; Peters, 1998a), through to less formal, looser and voluntary arrangements (Metcalfe, 1994).

While central control based on hierarchy has often been seen as the preeminent form of coordination, scholars have challenged this, arguing that alone it is not sufficient, and can suffer from limitations associated with flexibility, access to local information, and motivation (Wegrich and Štimac, 2014). Indeed, some have argued that informal, interactive networks based on trust and mutual self-interests have the potential to better manage the uncertainties that derive from policy complexity (Chisholm, 1989; Del Río, 2014). Such informal coordination activity, Alexander (1993) argues, can be sustained through regular contact and correspondence. Its non-routine character distinguishes it from more formal coordination activity. On the whole, however, both the policy mix and coordination literatures tend to focus on more formal structures associated with the 'machinery of government' (Braun, 2008b: p. 231).

In addition to formal and informal concepts of coordination, researchers have also identified different levels of coordination. Metcalfe (1994), for example, argues that the degree of coordination can be assessed by a policy coordination scale ranging from minimal to more complex arrangements. Scharpf (1997) describes minimal coordination as a form of non-coordination, in which parties take account of each other's policies, but do no more than seek to avoid conflicting policy actions. Alexander (1993) identifies a number of practical terms including inter-organizational groups such as working groups, coordination committees' task forces, coordinator individual, coordinator unit or body, lead organization, and single organization.

The broad definition of coordination adopted by many researchers has not always examined its different forms within governments. In recent years scholars have begun to explore this further in relation to policy coordination and coordination of administration (see Regens, 1988; Peters, 1998a; Braun, 2008b; Linder and Peters, 1987). Here, administrative coordination refers to bottom up harmonisation in which policy delivery actors seek to coordinate polices as they are introduced. Policy coordination, in contrast, is high level coordination of policy ideas and concepts. Peters (1998a) argues, however, that while useful this distinction represents a 'false dilemma' as both forms of coordination are often required.

The coordination literature, for the most part, does not consider its spatial dimensions (Magro et al., 2014). While the regional level can be the locus of substantial policy complexity, little consideration has been given to the potential for spatial proximity to support informal coordination at the regional level. Here research on regional development points to the potential for repeated interactions between actors over time, enabling *'communicative interaction, designed not simply to transmit information and preferences, but to achieve mutual understanding*' (Storper, 2002: p. 268). Indeed, discursive mechanisms at the regional level do not have to be of immediate benefit to actors, and may form part of a process by which parties begin to build trust over time (Henderson, 2000).

The role of agency is underemphasised in most accounts of policy coordination, with organizations and systems presented at the forefront of regional accounts of those such as Magro et al. (2014). Indeed the generally limited attention in the wider coordination literature downplays questions of agency and questions such as who coordinates and how. The aim of this paper, therefore, is to contribute to the debate on policy mix coordination by asking (1) How do tensions and trade-offs influence the need for coordination at the regional level? (2) What coordination roles are evident? and (3), How do they mediate the deployment of regional broadband infrastructure in the case considered? In answering these questions, the

paper seeks to move beyond whether the policy mix can be optimised, and to better understand the nature of their effects in managing the regional policy mix.

3. The research case and methodology

The paper follows a case-study methodology, with a study of broadband infrastructure deployment in Wales (UK). Wales is one of Europe's less developed regions, in recent years being a recipient of EU structural funding programmes, with the underlying development challenges facing the regional economy having changed little over this time. There exists a persistent gap in prosperity in terms of gross value added per capita between Wales and other UK and European regions (see Supplementary material).

The Welsh economy, traditionally dominated by coal and steel, has given way to one characterised by a high degree of services activity. Much of Wales' current population of 3.11 million[2], and regional economic activity, is centred in the southern coastal belt cities such as Cardiff, Swansea and Newport, and the South Wales Valleys. A smaller concentration can be found in the North East, while Mid Wales and North West Wales have a largely rural character, with agriculture and small market towns.

Of particular importance in Wales, with regards to wired and mobile connections, are its topography and rurality. Wales encompasses an area of 20,000 km^2 (or 8.5 percent of the total UK landmass), and is dominated by uplands, with 25 percent of the land being above 305m in elevation[3]. This topographical aspect creates challenges for broadband infrastructure deployment, with population pockets tucked-away in sometimes challenging to reach valleys and necessitating a greater number of mobile masts to provide effective coverage.

Table 1 highlights UK Government telecommunications and media industry regulator, Ofcom, data on premises[4] covered by fixed broadband speeds of at least 30 megabits per

second (Mbps). The data is for the UK and its constituent nations from 2012 to 2017. Here, it is noted that Wales, from an outlying position of 37% coverage of premises in 2012, had moved ahead of both Northern Ireland and Scotland by 2015, a position that was sustained to 2017.

Table 1 Premises covered by fixed broadband availability of at least 30 Mbps, UK and constituent nations, 2012 - 2017

	2012	**2013**	**2014**	**2015**	**2016**	**2017**
UK	65%	73%	75%	83%	89%	91%
England	68%	76%	77%	84%	90%	92%
Northern Ireland	95%	96%	77%	77%	83%	85%
Scotland	45%	52%	61%	73%	83%	87%
Wales	37%	48%	55%	79%	85%	89%

Sources: (Ofcom, 2013; Ofcom, 2016; Ofcom, 2017)

In terms of mobile coverage, statistics from Ofcom (2017) shown in Table 2 indicate that Wales has some way to go in comparison to the UK as a whole in respect of indoor and outdoor geographic coverage. This Ofcom report points to the challenges in delivering coverage across 'the large proportion of rural and mountainous areas' in Wales.

Table 2 Mobile coverage of telephone call and data services in the UK and constituent nations, 2017

	Indoor coverage, % premises		Outdoor geographic coverage, % landmass	
	Telephone calls	Data	Telephone calls	Data
UK	90%	85%	70%	63%
England	91%	87%	88%	82%
Northern Ireland	78%	75%	83%	76%
Scotland	87%	82%	40%	31%
Wales	80%	73%	62%	52%

Source: (Ofcom, 2017)

The case of Wales was selected for the research as a region that reflects complex multi-level policy, multi-dimensional policy, and multi-actor policy dynamics. As a devolved region with some powers to support broadband deployment it provides a setting in which, theory suggests, complexity is likely to produce diverse coordination challenges and responses. The

decision to focus on a single case-study was taken to allow for in-depth data collection to be undertaken, and to enable all elements of the policy community for broadband to be incorporated in the study. The focus on softer coordination activity and perspectives meant that survey methods were less suitable to collecting the rich qualitative and quantitative data sources necessary to understand practices and activities to minimise tensions between policy objectives (Yin, 1994; George and Bennett, 2005).

The research examined broadband deployment in Wales over the five-year period 2012 to 2017. The period of research coincided with the launch of the first all-Wales policy instrument to deploy broadband across all areas of Wales without access to so-called superfast broadband (with speeds in excess of 30 Mbps). The research utilised three main data sources: secondary analysis of policy documents; interviews with the broadband policy community in Wales; and analysis of news sources. Policy documentation was sourced from a literature review of websites and from government interviewees, and included policy statements, operational plans and consultation responses. The fieldwork for the case study included interviews with representatives of the multi-levels of governance in Wales and the UK including broadband deployment policy (access, take-up and use), regulatory bodies, and private telecommunications operators (large and small). These interviewees were selected using a 'snowball sampling' technique, with the focus on securing perspectives from the policy community over the period of research (2012-2017). A total of 24 interviews were completed between July 2017 and February 2018 (see Table 3).

Table 3 Characterisation of the Interviewees

Description	Number of interviews	Department/ agency interviewee belongs to (number of interviews)
Representatives of UK or Welsh Government/ Government Agencies	9	DCMS implementation (1) Broadband policy regulator (1) Welsh Government Policy (1) Welsh Government implementation (3) Welsh Government planning (1)

		Highways Agency implementation (2)
Local Authority representatives	4	Local Authority Digital Champions (3) Local Authority Highways (1)
Business agents	5	Private broadband deployment operatives - large scale (2) Private broadband deployment operatives - small scale (1) Mobile industry operator (1) Business representative (1)
Experts	4	Policy experts (3) Industry expert (1)
Politicians	2	UK Government (1) Welsh Government (1)

Note: DCMS, Department for Digital, Culture, Media & Sport (UK Government).
Source: Authors' own elaboration.

A semi-structured approach was adopted for these interviews, with questions focused on understanding respondents' roles, perspective on policies and their interactions, governance mechanisms to address tensions in the mix, and their achievements. Interviews were transcribed and coded by both researchers with the aid of Nvivo software, and themes coded to cover the research questions. In addition the authors collated and analysed a total of 1,072 news articles using the Nexis® news search database, covering the period 2012-2017.

4. Coordinating the policy mix for broadband deployment in Wales

The concept of the policy mix highlights the interface between policies as they seek to achieve a particular objective. The following sections review the existing literature on synergies and tensions in the policy mix, before turning to the challenge of managing these through coordination at the regional level.

Policies, synergies and tensions in Wales

Policies for broadband deployment reflect the complex governance arrangements that have emerged following devolution in Wales in 1999 (Rees and Morgan, 2001). While the UK

Government has direct responsibility for setting policy for fixed and mobile broadband telecommunications, the Welsh Government is able to fund broadband infrastructure in Wales (as are other sub-regions of the UK). Other important institutional bodies in this policy mix include Ofcom, the UK's regulatory body for telecommunications and media. While Ofcom are responsible for UK wide regulation, it has representation in Wales via an office and associated advisory panel. European Union (EU) regulations such as the Digital Agenda (European Commission, 2014), and ERDF funding in support of broadband deployment policy, adds further complexity to the policy mix in Wales, with public instruments in support of broadband subject to rules associated with EU policies, objectives and regulations (including, for example, spectrum decisions and state aid regulations for telecommunications investment).

The policy objectives established for broadband by the EU and UK Government during the period 2012 to 2017 were to ensure the rapid deployment of high speed fixed and mobile broadband access. The UK's Digital Strategy published in 2017 states that '*Broadband and mobile must be treated as the fourth utility, with everyone benefiting from improved connectivity*' (Department for Digital Culture Media and Sport, 2017b). In delivering its objectives for broadband the Welsh Government established the £425 million Superfast Cymru programme, with part-funding from ERDF through the Welsh Government (National Assembly for Wales, 2013). Operating between 2012 and 2017 Superfast Cymru was delivered through a contract with BT/Openreach. The focus of Superfast Cymru was on connecting premises (and therefore areas) that did not have access to superfast broadband at the time of the its launch (Henderson, 2017). This reflected the recognition that private sector deployment of infrastructure in largely urban areas had come to an end, leaving a number of 'not-spots' (Interview: broadband policy regulator 1). In addition, this deployment activity also included smaller grant schemes for businesses and communities to connect, take-up and

use broadband.[5] Mobile broadband infrastructure in Wales (and the wider UK) has generally received much lower levels of public subsidy, with the UK's Mobile Infrastructure Project (MIP) being a notable exception.[6]

The policy mix for broadband include aspects of strong synergy in policy objectives across the multi-levels of governance. Broadband policy instruments similarly exhibit positive synergies most notably in the integrated delivery of funding and support for take-up and use. Yet, despite this consensus in the policy agenda and instrument design at multiple levels of governance, broad conflict and tensions have emerged in the implementation process, most notably in horizontal agendas such as planning and highways.

The planning policy agenda has often been at the forefront of disputes in mobile broadband infrastructure. Planning Policy in Wales recognises that '*widespread access to affordable, secure telecommunications infrastructure is important to both communities and businesses*' (Welsh Government, 2017: p. 4). Tensions, however, are still evident in local planning processes (local authorities are responsible for planning decisions in their areas), with public opposition centred on visual amenity and health concerns, and expressed through the planning process, the region's media and consultation with politicians (Interviews with: UK Government politician 1; Welsh Government politician 1; and Local authority digital champion 2). Tensions have also been evident between the UK and Welsh Government, and Welsh Government and mobile operators with respect to mobile infrastructure height (English planning rules allow larger mobile towers under planning regulations, relative to those in Wales) (Office of the Secretary of State for Wales, 2017), and consistency of the application of planning regulations across areas (Mobile UK, 2018).

In the second area of tension identified the highways ownership agenda comes into conflict with broadband policy in the need to install fixed cabling in streets and footways, with

associated construction work and infrastructure such as roadside cabinets and mobile towers (Analysys Mason, 2017). This deployment can lead to delays in permission to access the highways, as well as indirect tensions that can result from road closures (for example, on high street roads during holiday periods, and in areas where high profile events are taking place). These tensions can be expressed in relation to complaints from the general public, negative media coverage, and involvement of other stakeholders such as politicians. They can also emerge where cabling and infrastructure crosses private land, requiring permission to be negotiated by private landowners and mobile and fixed operators (Interviews with: private deployment operator - large 1; and private deployment operator – small 1).

Coordination roles and activity in Wales

In addressing the tensions noted above the UK and Wales have established few formal structures and mechanisms to coordinate policies, outside of the separation of responsibilities established in the devolution settlement. While groups such as the Broadband Deployment UK (BDUK) network for UK and devolved administration officials provide opportunities to network and discuss the delivery of broadband projects across the UK, these groups exhibit limited coordination functions, and are largely standalone in nature.

This lack of formal structure to coordination reflects the consensus that exists in relation to addressing ‘not spots’, but also the small number of policy instruments that have been established in Wales and other parts of the UK. The informal nature of coordination activity in Wales is further enhanced by the compact nature of Welsh Government, which means that policy officials are largely co-located in a small number of public offices. This, as one interviewee argued, helped to aid discussion across departmental boundaries:

> *'…there's five big buildings and a few others but everybody is pretty much based together…so I can go and tap them on the shoulder and find them. The whole – 'which department are they in?' doesn't really make a difference.'* (Interview: Welsh Government, policy 1)

Despite the general lack of formalised coordination structures Wales has seen the establishment of a series of informal roles to coordinate broadband deployment and activities. Such roles reflect the cross-cutting nature of broadband and wider digital policy for policy organizations, resulting in the need to promote the policy objectives across different government agendas. While these roles do not necessarily carry the name of 'coordinator', they seek to address three main functional responsibilities in relation to the tensions identified.

In the period under study the roles of mid-ranking Welsh Government and local authority broadband or digital project managers were evident in seeking to build positive synergies between policy instruments. Such championing roles primarily seek to pre-empt tension, and encourage interaction between different policy agendas. This, for example, can be seen within projects funded by the European Structural Funds in Wales, where project managers proactively sought to manage the interface with other projects, and address potential overlaps. Here, policy officials engaged in ad hoc face-to-face discussions on how best to ensure delineation activities and encourage different project activities to work together (Interview: Local authority, digital champion 3).

In addition to this championing role the tensions evident in the broadband deployment policy mix have resulted in informal activity oriented towards solving particular problems. Such *troubleshooting* roles seeks to intervene in particular tensions or trade-offs and support parties to reach a resolution. This included staff within the Welsh Government and UK

officials whose role was to engage with partners and support the rollout of superfast broadband in Wales. This role was described by one Welsh Government official as follows:

> *I'm also very much in the engine room of our superfast broadband project, in terms of dealing with the problems that we have with stakeholders. I'm often thrown the challenges that come in through the minister's office sometimes, or external stakeholders'* (Interview: Welsh Government, implementation 3).

Similar trouble-shooting roles are evident at the UK level, with the creation of the UK government's Department for Digital, Culture, Media and Sport (DCMS) Barrier Busting Taskforce (BBTF) in the latter part of the period under consideration. Although described as a taskforce the BBTF comprised individuals brought together to help speed up the delivery of broadband infrastructure across the UK. The work of these roles involves mediation between different parties, and engagement with officials from other policy areas. Such activity may achieve a solution in some cases, but in others trade-offs are necessary:

> *'It's my job to stick myself in between a dispute. I will then create a resolution, however that may be, that will be 95% a compromise between the two, or push for a certain action to take place.'* (Interview: DCMS, implementation 1).

While the troubleshooting role is largely reactive in relation to conflict, the policy mix for broadband also exhibits roles that seek to *monitor* deployment and potential barriers, and to take action. While this, on occasion, included sending instructions to champions or troubleshooters, the primary focus of this role was one of planning and monitoring, with a view to anticipating and addressing coordination challenges. Such roles were evident in the role of project managers monitoring deployment of their own broadband projects, but also the way that managers from related areas such as highways sought to manage and monitor potential tensions. Here, for example, officials from the highways departments of local

authorities and traffic agencies recognised the potential for broadband deployment to impact on the efficiency of the roads network, and sought to work together with BT/Openreach to ensure potential problems were identified. These actors met as part of an informal group on a number of occasions over the course of deployment and were able to agree actions to 'flex' local regulations for roadway repair following fibre laying, and '*look for any potential conflicts in our plans'* (Interviews with: Highways Agency, implementation 1; and Highways Agency, implementation 2).

Coordination mediation

The effects of coordination activity on the deployment of broadband was expressed in a number of forms, including strengthening synergies, addressing tensions and problems, and monitoring the policy implementation process. Together the highlighted coordination roles sought to emphasise the overall strategic importance of deploying broadband infrastructure for government strategy, and mediate conflict. These roles drew on the resource of policy consensus regarding the objectives of broadband, but also their social acuity and policy knowledge to coordinate and manage tensions.

The conflict resolution activities of troubleshooters were expressed in the large number of often small-scale interactions between actors in the implementation process. While much of the effect of these interactions was unseen by the public, the effect on reducing tensions supported the speed and efficiency of deployment. As a representative of a large mobile operator put it '*These challenges impact on the ability of the [mobile] operators to make additional investments, and secure coverage'* (Interview: mobile industry operator 1). In this respect while the role of trouble-shooter could help to manage specific problems, and reduce pressure on Welsh and UK Governments the overall scale and complexity of these tensions, mean that it was not possible or practical for such roles to fully eliminate conflict in the

deployment process. The difficulties of foreseeing (and eliminating) such challenges was expressed by one highways interviewee when talking about their efforts to minimise disruption from broadband deployment:

> *We only tend to hear about it when it goes wrong. What we get right, nobody ever even sees or hears about. It's only when things go wrong that we tend to get involved* (Interview: Highways Agency, implementation 1).

The effects of coordination champions were expressed in synergy building activity around policy development for broadband deployment in Wales. This included champions seeking to build support across-departmental development policy agendas within government - for example integrating economic and planning objectives into the Welsh Government Mobile Action Plan (Welsh Government, 2017), and the creation of cross-departmental digital champion roles in the Welsh Government and Local Authorities across Wales. At the regional level such roles are further enabled by actors engaging in face-to-face interaction and consensus building around the need to deploy fixed and mobile broadband in Wales.

Additionally, monitoring roles represented a further area whereby coordination aided the deployment of broadband in Wales' 'not spots'. Here the role of coordination actors was evident at multiple levels of the UK and Welsh Government (for example, the Welsh Government's Advisory Panel for the SFBE project). These monitoring actors utilised these formal groups to provide greater capacity to share knowledge, identify potential implementation issues and solutions. As one senior policy / industry expert argued, when reflecting on his role in one such grouping:

> *'If anybody else comes along and has got a similar [policy idea], then it's in our mind-set to tell them about what we are doing and to work with them to provide even greater support for our Welsh SMEs.'* (Interview: policy expert 3).

Such monitoring was also evident in the broadband implementation process, with highways actors working alongside BT/Openreach to understand progress and ensure tensions were minimised/synergies maximised (Interviews with: Highways Agency, implementation 1; Highways Agency, implementation 2; Local authority, highways 1; and private deployment operatives – large 2).

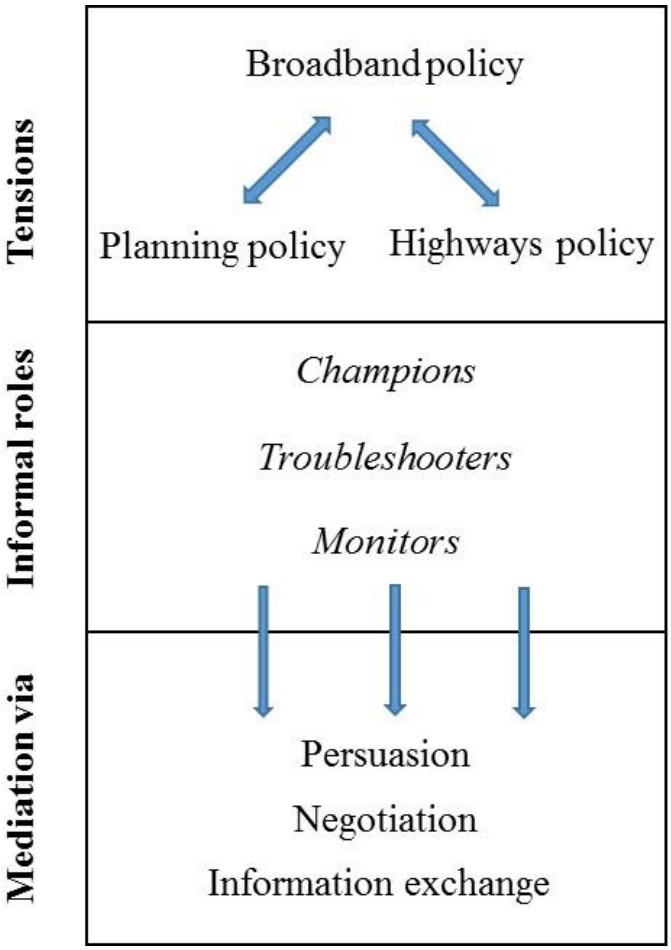
In building synergies and addressing prospective and actual tensions the coordination actors have contributed towards the overall success of the delivery of fixed line broadband in Wales. This has seen some 600 thousand premises connected over the period, reaching 96% coverage of premises in Wales with fixed line broadband at speeds above 30 Mbps (Welsh Government, No date). Without their work, however, it is likely that tensions in the deployment progress would have been higher. The limits of coordination agency, in this respect, suggest that it is not possible to develop an optimal policy mix. Indeed, the ongoing difficulties faced by mobile broadband deployment, and the efforts of policies such as the Mobile Action Plan (Welsh Government, 2017) suggest continuing challenges, as does the remaining 88 thousand premises in Wales that have yet to be reached by either the private sector or Superfast Cymru (Welsh Government, 2018).

5. Discussion

By examining the coordination of the regional policy mix for broadband and the role of coordination agency this paper contributes towards research examining policy-making processes and their complexity at the regional level (Magro et al., 2014). This is an area that has yet to receive many contributions from researchers in the area of broadband policy and

the wider regional studies literatures. In doing so it seeks to move beyond studies that emphasise organizational aspects of regional and national coordination, and to play closer attention to the role of agency and informal activity in the coordination and management of tensions in the regional policy mix (Flanagan and Uyarra, 2016). A high-level schematic of our findings are set out in Figure 1.

Figure 1: Tensions, roles and their mediation



The first research question asks where coordination is found in the policy mix for broadband. This finds that while the distinction between policy and administrative coordination has been established by scholars (see Regens, 1988; Peters, 1998a; Braun, 2008b), the results suggest that implementation at the regional level represents the principle area of coordination

challenge. This highlights the spatial nature of these tensions and coordination activities, which is under explored by research in this field (Magro et al., 2014). In this respect the geographical footprint of broadband deployment results in conflicts and coordination activity often (but not exclusively) being focused in harder to reach areas where infrastructure is least dense (Grubesic and Mack, 2016). This derives from the difficulties in siting broadband infrastructure discretely in rural and semi-rural areas, and concerns regarding its impact on the visual amenity of the environment. The regional and sub-regional nature of these tensions means that much of the coordination activity identified takes place at the 'last mile' of broadband deployment, and is localised in nature.

In relation to the second research question 'what coordination roles are brought to bear in the policy mix for broadband deployment at the regional level?' the results give support to research that highlights the importance of purposive agents and loosely coupled arrangements in the coordination of complex policies (Chisholm, 1989; Alexander, 1993; Magro et al., 2014). The research finds few examples of formal coordinating structures or organizations established to manage the complex policy mix, outside of the legal allocation of policy responsibilities between the different levels of governance. In contrast to other contributions to the literature in coordination of the policy mix (Pelkonen et al., 2008; Magro et al., 2014) the research emphasises the role of informal coordination agency at the heart of managing tensions and promoting synergies. Here, the research introduces three coordination roles evident in the regional policy mix for broadband deployment in Wales:

- *Champion* – the findings highlight the role of champions in seeking to build synergies between different policy objectives and instruments. This purposive activity seeks to pre-empt conflicts, promote understanding of objectives across departmental boundaries, and help to minimise their impact on the overall objectives of the policy.

These roles were found in Welsh Government and local authority managers, often with a broadband or wider 'digital' remit.

- *Troubleshooter* – these roles were similarly evident at multiple levels of government, with a focus on addressing specific implementation problems through discursive negotiation, persuasion and talk. This role is at the forefront of dealing with tensions, and managing expectations of partners, and was found in the creation of partner engagement roles in both Welsh Government and the UK Government.
- *Monitor* – such roles were found in the oversight of implementation progress. This role has an emphasis on ensuring the delivery of a policy is met, and potential barriers identified. It represents a much more strategic function that that of the troubleshooter, with an emphasis of forward and backward examining of progress. This role was associated with project managers, but also in members of groups established to monitor progress.

Despite the terminology of 'roles', the findings suggest that these do not refer only to individual policy makers. Instead, policy makers can take a number of roles at any one time or place, for example, in the case of champions who engage in monitoring groups. In this respect they reflect different facets of loosely coupled arrangements that can emerge to address uncertainties that derive from policy complexity (Del Río, 2014), and the flexibilities that are required to access local information of deployment tensions and challenges (Wegrich and Štimac, 2014).

While the second research question examines coordination as a process, the final research question asks how these coordination roles mediate the deployment of broadband infrastructure networks at the regional level. This represents an area that few studies of coordination have addressed to date (Wegrich and Štimac, 2014). Here the findings show that coordination is an interactive process of information exchange and talk, reliant on soft skills

in being able to negotiate between other actors with a remit for competing policy priorities and objectives. While the results do not imply that coordination can overcome all issues and tensions faced, or indeed create an optimised system (Chisholm, 1989; Flanagan et al., 2011; Magro et al., 2014) in the deployment of broadband at the regional level they do show how their role can help to mediate tensions and real time conflicts in the deployment process. This conflict reduction role is one that the results suggest is an important contributor to managing and preventing tensions from escalating further. This can also contribute towards efficiency in deployment (Peters, 1998b) by speeding up the process, and reducing installation costs. This can help to ensure greater coverage of infrastructure, and reduces public dissatisfaction with the deployment.

While drawing attention to the role of agency and informal interactions in the management of tensions this paper recognises the role of wider context facing actors seeking coordination (Braun, 2008b; Regens, 1988; Alexander, 1993). While outside the immediate scope of the research questions of this study, the findings point towards important factors such as public and business pressure for improved broadband connectivity and the growing use of digital device use, as well as the role of political consensus in shaping the role of coordination agents. In this respect this interaction between structure and agency at the regional level is an area where further research could usefully add to understanding of regional coordination action and agency.

Although the results of the research provide evidence of tensions and activities to resolve, it also shows that the deployment efforts of policy makers in Wales have been largely successful in achieving deployment targets in the vast majority of areas of Wales. The future direction of policy, towards ‘full fibre’, ‘gigabit’ broadband solutions, and new mobile broadband standards (5G), however, suggests that the role of policy coordinators in this area is likely to continue into the future.

6. Conclusion

This paper seeks to draw attention to the interface between policies at the heart of the deployment of regional broadband infrastructure. Drawing on the case of Wales it asks what role is there for coordination at the regional level. It addresses this by examining the nature of conflicts, the roles associated with coordination, and their mediation in achieving the goal of rapid deployment of high speed broadband. The paper makes three contributions to the literature on coordination of the policy mix:

First, it finds that the coexistence of consensus and conflict in the policy mix for broadband deployment, with broad agreement of the rationale and objectives of policy, gives way to conflict and tensions at the regional level as it enters the implementation phase. These tensions and associated mediation activity have a distinct spatial nature, and are principally found on the 'last mile' in harder to reach areas where infrastructure is often less dense, making it more difficult to install discretely. While researchers have recognised the potential for tensions and coordination to occur in the administration of policies, this paper argues that greater precision in specifying the point in the policy process can add to our understanding of the policy mix and its coordination.

Second, the findings suggest few formalised coordination mechanisms are evident in the broadband policy mix. Instead the paper introduces three informal roles for coordination – champion, troubleshooter and monitor. These roles, while not mutually exclusive, are largely drawn from the region's policy community (but also span the boundary between the regional and national levels of the policy mix), and help to bring local information to the solution of policy mix tensions.

Thirdly, the findings suggest that the mediating activity of these coordination roles helps to minimise tensions in the policy mix, and to encourage the efficiency of the implementation

process. This is supported by an interactive process of information exchange, talk and soft skills in negotiating trade-offs between policy priorities such as highways and planning. While evidence of coordination helping to address tensions at the regional level was found, the findings caution against statements suggesting it is possible to eliminate all tensions, or indeed optimise the coordination process and policy mix.

In alignment with the work of Reichardt et al. (2016) the paper further identifies the importance of contextual factors such as public and business pressure for broadband access, the rapid adoption of devices and growing e-business and e-government services, and suggests the interaction between coordination actors and these factors represents an emerging research agenda for researchers. Finally, it suggests that despite the rapid deployment of high speed broadband in Wales, the challenge for regions will be to manage tensions as technology change introduces new forms of infrastructure and policy priorities emerge (e.g. 5G, and ‘full fibre’).

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Footnotes

[1] In this paper the term broadband is used to refer to both fixed and mobile infrastructure unless stated.

[2] https://statswales.gov.wales/Catalogue/Population-and-Migration/Population/Estimates/nationallevelpopulationestimates-by-year-age-ukcountry

[3] http://earthwise.bgs.ac.uk/index.php/Hydrogeology_of_Wales:_Introduction_-_topography,_climate,_land_use_and_natural_resources

[4] Defined as both home and business premises.

[5] These projects included Access Broadband Cymru (individuals, households and business) and Ultrafast Connectivity (business) vouchers to support premises not served by Superfast Cymru, a marketing campaign in in the Superfast Cymru intervention area and the Superfast Broadband Business Exploitation (SFBE) project part-funded by ERDF through Welsh Government National Assembly for Wales. (2017) Economy, Infrastructure and Skills Committee - Digital infrastructure in Wales, Evidence from BT Group. Cardiff: National Assembly for Wales..

[6] MIP was a UK project launched in 2013 to improve coverage and quality of hard to reach areas. Progress in delivering its target of 575 new masts was limited by challenges associated with site acquisition and planning regulations. Department for Digital Culture Media and Sport. (2017a) Mobile infrastructure project: impacts and benefits report. London: DCMS.