



Optimising the social, urban, and environmental co-benefits
of coworking spaces in the rehabilitation of Irish towns.

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Declaration of original authorship

I hereby certify that the submitted thesis is my own work, based on the author's original research. The work was completed while registered as a candidate for the MAUCA degree, and I have not obtained a degree elsewhere on the basis of the research presented in this submitted work.

Signed

A handwritten signature in black ink that reads "Stephen Paul". The signature is written in a cursive style with a large, stylized 'S' and 'P'.

Date

30.08.2021

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Abstract

Modern developments in information and communication technologies have allowed remote working to become a commonplace feature of the work landscape. Coworking spaces are shared offices in which desk space is rented to remote workers, freelancers, and small enterprises including start-ups. Coworking spaces offer the social, technological, and networking advantages of an office, while allowing workers the freedom to reside in a location of their choice. Irish Government policy is strongly supportive of the establishment of coworking spaces in rural communities to provide employment diversity and retain populations, complementing ongoing efforts to encourage the sustainable rehabilitation of town and village centres. While offering a viable workplace for users, successful coworking spaces can also provide a range of social, urban, and environmental co-benefits to their communities. The thesis aims to identify these co-benefits and define how best to engender these outcomes in the planning and operation of coworking spaces. A literature review examines the studied impacts of coworking spaces internationally to date. Primary research investigates the impacts and experience of coworking space operators in Ireland. The study uses an integrative process to categorise the co-benefits and analyses the data to create guidance on how coworking spaces can best benefit Irish towns and villages. The thesis concludes that a successful coworking space can contribute to the economic and environmental sustainability of town centres, and the social vitality of communities.

List of acronyms

AV	Audio-visual
COP	Conference of the parties
CWS	Coworking space
DRT	Demand responsive transport
EO	Employer office
ETS	Emissions trading system
GHG	Greenhouse gas
HVAC	Heating, ventilating, and air conditioning
ICT	Information and communication technologies
LED	Light emitting diode
ROI	Republic of Ireland
SDG	Sustainable development goals
SWT	Satisfaction with travel
TCLI	Town Centre Living Initiative
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
VAT	Value Added Tax

1. Introduction

The thesis examines the phenomenon of coworking spaces (hereafter CWSs) and their various co-benefits for towns and communities, contributing to the discussion on how best to optimise the positive outcomes arising from CWSs. Section 1 establishes the research aims, definitions, and theoretical framework of the study and outlines the development of teleworking and CWSs since the turn of the century. Section 2 reviews the emerging policy framework, which is highly encouraging of CWSs as a method of invigorating rural and small-town communities. Section 3 examines the academic literature relating to the environmental impact of CWSs, examining if claims for urban and environmental sustainability gains are substantiated by research. Section 4 explains the methodology used for primary research. Section 5 presents the findings of the research, while section 6 offers a discussion of the findings. Section 7 includes concluding remarks and notes areas of potential further study.

1.1 Research overview

The thesis is borne from a desire to study the full range of co-benefits of CWSs in the rehabilitation of Irish towns, with the aim of creating a set of principles in the planning and operating of CWSs that maximise these co-benefits for communities. The research investigates how to employ CWSs as a tool to tackle multiple problems facing Irish towns, such as a low carbon transition, vacancy and dereliction, and poor planning outcomes. The study adopts the following research questions:

- What are the social, urban, and environmental co-benefits of CWSs?
- How can these co-benefits be encouraged through policy and management?

A literature review examines relevant research papers and academic studies. Primary research includes a survey of CWS users and semi-structured interviews with owners/ operators/ managers of CWSs. The research methods were subjected to the UCD ethical review assessment procedure. This process established an ethical framework for the study, defining acceptable processes relating to data gathering, analysis, and storage.

1.2 Definitions and theoretical framework

The thesis relates to the co-benefits of CWSs in the context of town rehabilitation. Co-benefits are additional benefits accruing to communities, workers, economies, and environments from the operation of CWSs, in addition to the primary benefit of a viable CWS. The term co-benefit is often invoked in relation to climate action, referencing advantages gained from lowering GHG emissions that are not directly related to climate, such as energy independence through renewables development (IPCC, 2007). Town rehabilitation is the process of reversing unsustainable trends evident in Irish towns in recent years, including vacancy and underuse of buildings, residential development focused out of the town centres, lack of employment opportunities for young people, and commercial and economic decline (Crowe et al., 2020).

CWSs facilitate both freelance and remote workers (also referred to as teleworkers). The 2002 European Framework on Telework (European Commission, 2002, 7) adopted the following definition of telework:

A form of organising and/ or performing work, using information technology, in the context of an employment contract/ relationship, where work, which could also be performed at the employer's premises, is carried out away from those premises on a regular basis.

The government's Remote Work in Ireland document refers to coworking as regular attendance at a shared workplace where collaboration and networking outside of one's team or organisation is encouraged (Irish Government, 2019b).

CWSs differ in size, role, and patronage, with both private and not-for-profit business models. Yu et al. (2019) identify CWSs as offering a mixture of physical space, beneficial characteristics (community, flexibility, social ties) and shared workplace facilities (Wi-Fi, IT security, hardware such as printers). In a study of CWSs in Milan, Mariotti et al. (2017) identified three types of CWS: large, complex spaces often including additional facilities and services; small CWSs offering limited space to often specific business types such as architecture; and more mixed spaces in terms of both original intentions and dimensions. The Government's national online reservation

portal for CWSs, Connectedhubs.ie, uses a broad definition of CWS, with coworking and collaborative spaces, hot desks, meeting facilities, and virtual office facilities listed (Irish Government, 2021c). This paper adopts this broad definition, as Irish Government policy is a key aspect of the study.

The Irish Government's Making Remote Work document associates CWSs with both economic and climate sustainability (Irish Government, 2021e, 19). However, no consensus on the definition of sustainability in relation to these spaces has been established. Oswald and Zhao (2020) investigated if a common understanding of the term exists among CWS users, identifying identified four distinct perspectives on sustainability. They are:

- i) "New Work"- those who believed in a sustainable coworking community, having flexible access to the co-working space, sharing resources and office infrastructure, creating in the short term a convivial working environment.
- ii) "Resourceful Society"- those who considered sustainable energy consumption the prime concern, using existing buildings as co-working spaces, travelling in low- or no-carbon modes, installing low energy lighting systems and micro-generation facilities.
- iii) "Incubator"- those who focused on the long-term sustainability of the enterprises of the co-workers, which could be maximised by developing a truly collaborative, co-operative and mutually supporting network.
- iv) "Environmental"- those who focused on environmental sustainability, including minimising waste, composting, recycling, and reduced energy use.

While the four perspectives differ significantly, the study found that all participants had a high sustainability consciousness, even if their main priorities were in organisational rather than environmental sustainability. This paper focuses on definition iv) Environmental. Within this definition exist the social, urban, cultural, and ecological environment of the CWS. These aspects of environmentalism are interrelated and form the basis of the study of social ecology.

1.2.1 Coworking spaces and social ecology

Social ecology is a philosophy developed by Murray Bookchin (1921-2006) examining the relationship of humanity to nature (Bookchin, 1990). Bookchin considers hierarchical relationships to be the cause of ecological breakdown (Best, 1998). According to Bookchin, early human communities were egalitarian, employing a system of *usufruct*- communal sharing of resources according to need- with no private property. Age and gender-based hierarchies gradually emerged, leading to power, class, and material inequalities. Bookchin sees the domination of one person over another as a colonial instinct to derive power and profit which, once established, extends to the natural world. Bookchin calls for the rejection of hierarchies in the pursuit of a form of 'eco-anarchism' or 'libertarian municipalism' (ibid.). Bookchin believes technology can help create a sustainable society. Key to this is the ending of capitalism and the removal of all systems of human hierarchy (ibid.).

Place-based hierarchies are one form of hierarchy featuring in Bookchin's work- including the domination of town over country. Modern economies often require rural dwellers to leave their homeplace to travel to cities to find work (Buksh and Mouat, 2015). This rupture of family, community, and identity is antithetical to social ecology. Similarly, the employment and property markets can force city-based workers to live far from their workplace, resulting in resource and time-intensive commuting patterns, with negative consequences to human and planetary health (Hook et al., 2020). Coworking spaces can undermine these hierarchies, allowing workers freedom to choose their geographic location (Buksh and Mouat, 2015). Natural human relationships with family, people and landscapes are facilitated. CWSs facilitate cooperative and egalitarian structures seen by Bookchin as qualities of 'organic', or harmonious, societies (Best, 1998).

1.3 Remote work and coworking spaces

1.2.1 Evolution of remote work: teleworking

Modern information and communication technologies facilitate flexibility in worker location, with increasing numbers working remotely from the employer office, at home or in satellite workplaces known as telecentres (Henderson and Mokhtarian, 1996). Telecentres, also referred to as remote working hubs or co-working spaces

(CWSs), are increasing in popularity and are associated with personal, economic, community, and sustainability benefits (Hook et al., 2020).

The development of fax machines made teleworking a possibility by the 1960s, although initially it was promoted for social rather than environmental benefits, as shorter commuting times could facilitate family life, leisure activities, and reduce stress (Hook et al., 2020). In recent decades, environmental concerns such as traffic congestion, air quality, and climate change have increased interest in teleworking (Henderson and Mokhtarian, 1996; Hook et al 2020). Teleworking from home has drawbacks such as a lack of networking opportunities, limited access to office infrastructure, difficulty in maintaining a balance between work and personal life, and family distractions (Spinuzzi, 2012). Co-working spaces offer technology sharing, social and professional interaction, routine, and concentrated workspace, leading to reduced stress, increased leisure time, energy, and potential environmental benefits (Henderson and Mokhtarian, 1996).

The environmental impact of teleworking from home has been widely studied (Hook et al. 2020). Claims of greenhouse gas (GHG) emissions reductions due to decreased levels of work-related travel have been examined, and most studies find environmental benefits, although the overall impact depends on the methodology of the study and the level of consideration of rebound effects. As co-working spaces are a more recent phenomenon, less research has been done on their environmental impact. Section 3 of this paper reviews the academic literature related to CWSs.

1.3.1 Evolution of co-working spaces

Berbegal-Mirabent (2021) describe the development of CWSs since the 2000s as driven by several factors including the rise of entrepreneurs and freelancers in that period, notably in the aftermath of the economic crisis of 2008. CWSs as a concept developed in the 1990s, with shared working spaces in Berlin serving primarily as a means of sharing facilities. The more modern concept of CWSs as communities of co-workers was developed by Brad Neuberg in San Francisco in 2005, with the opening of the “Hat Factory” - a CWS for professionals and freelancers who sought networking

and collaborative opportunities (Mariotti et al., 2017, 48). By 2019, an estimated 2.2 million people worked in 22,000 CWSs around the world (Berbegal-Mirabent, 2021).

CWSs have been described as “serendipity accelerators”, for their potential to provide opportunities for meetings and collaboration between creative people and entrepreneurs seeking to avoid isolation and find a convivial environment for knowledge exchange (Moriset, 2014, Mariotti et al., 2017). Spinuzzi et al. (2019) emphasise the fundamental attraction of CWSs as the capacity for community building.

CWSs have been identified as a key ingredient in the success of the 15-minute city concept (Motamed and Shirvanimoghaddam, 2021). The concept involves the provision of a city-dweller’s needs- from work to leisure to retail- within a 15-minute walk or bicycle ride from their place of residence. Local co-working spaces offer the potential for a short, carbon free commute. This can boost worker motivation, improve mental health, and enhance work-life balance (ibid.).

Covid-19 travel restrictions have normalised remote work for a large sector of the working population, with the benefits of flexible work practices being demonstrated to employees and employers (Leonardi, 2021). Section 2 examines government policy relating to remote work and town rehabilitation issues.

2. Policy overview

The policy overview examines relevant Irish Government policy in areas related to the study. The overview examines policy in a sequence from general policies on climate change and remote work, to specific policies on town rehabilitation and rural transport.

Ireland is one of 193 signatory countries to the 2030 Agenda for implementation of the United Nations Sustainable Development Goals (UN, 2015), with the first National Implementation Plan adopted in 2018. The Government has committed to linking new and revised policy to the principles of the Sustainable Development Goals (Irish Government, 2018). Goals relevant to the current study are summarised in Table 1.

Goal	Description	Target	Description
8	Decent work and economic growth	8.3	Promote development-oriented policies that support productive activities, decent job creation, entrepreneurship, creativity, and innovation, and encourage the formalization and growth of micro-, small-, and medium-sized enterprises, including through access to financial services.
11	Sustainable cities and communities	11.4	Strengthen efforts to protect and safeguard the world's cultural and natural heritage
13	Climate actions	13.2	Integrate climate change measures into national policies, strategies, and planning

Table 1: UN Sustainable Development Goals relevant to research

Project Ireland 2040 (Irish Government, 2021g) sets out the Government's spatial planning and infrastructure investment roadmap over the period to 2040. The National Planning Framework (Irish Government, 2021g) was published under Project Ireland 2040, and establishes a policy and planning framework for development up to 2040. A series of National Strategic Outcomes was established, including compact growth, strengthened rural economies and communities, and sustainable mobility. The urban and environmental benefits associated with CWSs align in principle with these goals, which overlap significantly with the UN Sustainable Development Goals.

2.1 Climate action

Ireland is a party to the United Nations Framework Convention on Climate Change (UNFCCC) and the 2015 Paris Agreement, under which states committed to address GHG emissions, mitigation, adaptation, and financial issues, with an aim to limiting global warming to 2 degrees maximum (UN/ UNFCCC, 2015). The EU has established an emissions trading system (ETS) as part of its target to reduce GHG emissions by 80-95% by 2050 compared to 1990 levels. This scheme targets industry and energy generation but omits buildings and transport- two sources of high emissions associated with urban communities. EU emissions reduction targets were strengthened in the Climate Policy Framework for 2020 to 2030 (European Commission, 2014).

The Climate Action Plan 2019 (Irish Government, 2019a) was published on foot of the recommendations of the Citizens Assembly on Climate Change, which was established under the provisions of the Programme for Government (Irish Government, 2020). The plan seeks to increase the rate of decarbonisation of the Irish economy by identifying the least burdensome and most potentially beneficial means to do so. For the built environment, the plan calls for major energy efficiency upgrading of existing building stock and increased energy standards for new builds. The plan recognises spatial pattern, urban form, and mobility as considerations in a climate context, as well as the built envelope of individual buildings. The plan calls for a modal shift to public transport, walking, and cycling, with a commitment to 500,000 additional active travel journeys per day by 2035.

The Climate Action and Low Carbon Development (Amendment) Bill 2021 (Irish Government, 2021b) provides a legal framework for Ireland's decarbonisation policy, establishing binding targets for reductions in GHG emissions. A system of carbon budgets, accounting, and governance will ensure an all-of-government approach to reducing emissions, with the 'National Climate Objective' defined as the goal to achieve a carbon neutral economy no later than 2050. Both national government and local authorities are tasked with forming mitigation and adaptation measures. The Bill will impact on all government departments and activities, including planning and transport, with ministers accountable for the performance of their departments in relation to the bill.

2.2 Remote work

In 2019 the Irish Government published the Remote Work in Ireland document (Irish Government, 2019b), identifying the potential of remote working to increase participation in the labour force, improve productivity, attract and retain talent, and assist in the transition to a low carbon economy. The document built on a programme of stakeholder research to identify the needs of employers and employees relating to remote work policy in Ireland. The Government committed to addressing key issues relating to the successful implementation of a remote work policy, including guidance, training, data protection, health and safety, and remote working hub infrastructure.

The legal framework surrounding remote work in other jurisdictions is examined in the Remote Work in Ireland document. The UK Government published guidance on flexible working and work/ life balance (ACAS, 2014), including recommendations on employer remote work policies. The report notes the importance of defining who is responsible for office and IT infrastructure in the remote location. In Finland, the legal concept of a 'workplace' is evolving into a 'working place', with full-time employees able to decide when and where they work for at least half of their working hours (Finnish Government, 2019). The Netherlands places less responsibility on the employer to ensure a healthy and safe work environment in an alternative location than exists for employers in Ireland. In addition to this research, a Remote Working Consultation Forum was held in July 2019. The forum was attended by over 60 public and private sector stakeholders who contributed to the scope of the final report.

The Remote Work in Ireland document was followed by the Making Remote Work: National Remote Work Strategy document in 2021 (Irish Government, 2021e). This strategy identified policy positions to achieve the aims of the Remote Work in Ireland document. The strategy is based on three pillars, as follows:

- To create a conducive environment for remote work- including employee rights and tax supports.
- To develop and leverage remote work infrastructure- including establishment of a network of 400 remote working hubs; mapping and classifying all hubs extant in Ireland; and investigating how hub infrastructure aligns with the low carbon economy.
- To build a remote work policy and guidance framework- including cross-departmental cooperation and extensive data gathering on remote work.

The document is confident remote working hubs can have a transformative impact on local economies and communities, as well as facilitating greater geographical distribution of knowledge economy roles.

2.3 Town rehabilitation

The publication of Our Rural Future: Rural Development Policy 2021-2025 (Irish Government, 2021f) marks a commitment by the government to coordinate policy on

rural issues in a holistic way. The document sees towns as hubs of economic and social activity, with a large part to play in the wellbeing and sustainability of rural life. As a means of promoting the regeneration, repopulation, and development of rural towns and villages, the document envisages a significant investment in remote working infrastructure, including hubs and broadband. The policy also aims to provide financial support to local authorities to bring vacant properties in town centres back into use as remote working hubs. As part of the push to establish remote working as a means of retaining skilled workers and entrepreneurs in rural areas, the government has launched an integrated network of 400 remote working facilities with a single online booking platform (Irish Government, 2021c).

Other town related aspects of the Our Rural Future document include a commitment to the Town Centre First approach- whereby the development and regeneration of town centres will be prioritised in planning terms. Efforts to rehabilitate vacant derelict buildings will be enhanced with an expansion of the Town and Village Renewal Scheme, along with a review of the Living Over the Shop scheme. To avoid a proliferation of one-off housing in rural areas, Our Rural Future envisages seed funding being provided to local authorities to provide serviced sites at cost in towns and villages. Dedicated local authority staff will be employed to support town centre renewal.

Several of the goals of Our Rural Future relating to the revitalisation of rural towns and villages build on the findings of the Town Centre Living Initiative report, an independent report commissioned by the Department of Rural and Community Development in 2019, which explored how to encourage increased residential occupancy in rural towns and villages (Crowe et al., 2020). This report identified several causes for high vacancy rates and general lack of residential occupancy in Irish towns and villages, including financial and legal obstacles, concerns over personal and traffic safety, and lack of confidence in the future and liveability of town centres. The report suggests a range of policy options to address these issues. Our Rural Future commits to examining these recommendations, in particular the scope to introduce new supports and incentives for the refurbishment of vacant properties to promote town centre living.

2.4 Rural transport

Ireland's low population density and dispersed settlement pattern result in a high level of car dependency and resultant carbon emissions. Over two million private cars account for 74% of all journeys, rising to 81% in thinly populated areas (Irish Government, 2019d). Census results indicate car ownership rising, with 77% of urban households and 91% of rural households owning at least one car. In 2017 private cars were estimated to account for 52% of transport related GHG emissions in Ireland. Depopulation of rural areas due to national or international migration of young people in search of higher paid employment results in a loss of revenue for local public transport services. A vicious cycle ensues whereby services are curtailed or cancelled, forcing car ownership on rural populations devoid of public transport alternatives (Carroll et al., 2021). The National Transport Authority recognises this as a market failure and attempts to ameliorate it through the Rural Transport Programme (RPT, or Local Link), a service offering transport links to remote communities, facilitating trips to hospitals, post offices, retail centres etc. (NTA, 2013, 6). These services are operated by local private companies through government subsidy, and where offered, have experienced considerable increases in passenger numbers (ibid.). Nevertheless, service coverage is sporadic and large areas of rural Ireland remain car dependent (ibid.).

Government policy relating to smart and active travel has been informed by the Smarter Travel 2009-2020 document (Irish Government, 2009). This document contained targets for creating cycling infrastructure, providing safe walking routes, promoting alternatives to car travel, and enlarging car free areas in urban centres. Budget constraints following the economic crisis of 2008 resulted in a shortfall of voted capital expenditure to implement the plan. Nevertheless, some institutional reforms envisaged by the plan were carried out, including the establishment of the National Transport Authority (NTA). The Government is currently undertaking a review of the national sustainable mobility policy with a view to creating a replacement for Smarter Travel 2009-2020. This review is examining active travel, climate change issues, land use planning, and transport accessibility. The review's research has been published in a series of guidance documents (Irish Government, 2019c, Irish

Government, 2019d, Irish Government, 2019e). The document on public transport reveals public transport in rural Ireland is provided via Local Link, Bus Éireann and private bus services, some rail links, and Small Public Service Vehicles (SPSVs)- taxis, hackneys, etc. Public transport services are mostly concentrated in areas where the market has failed to provide alternatives. The research reveals higher levels of travel to work and education by car in rural than in urban areas.

Project Ireland 2040 (Irish Government, 2021g) considers active travel a means of achieving several of the National Strategic Outcomes, including compact growth, transition to a low carbon and climate resilient society, and strengthened rural communities. The plan promises to promote convenient alternatives to the car by promoting walking and active travel in existing and proposed developments. The Our Rural Future document (Irish Government, 2021f) envisages major investment in walking and cycling infrastructure, along with public transport services.

2.5 Conclusion

A review of current government policy reveals a strong emphasis on using CWSs to assist in rehabilitating rural and town communities across Ireland. The policy is based on several assumptions around remote working and CWSs- that they can assist in the low carbon transition, that they allow knowledge workers to remain in/ migrate to rural areas, that they stimulate local economies, and that they reinforce plans to increase residential occupancy of town centres. These assumptions will be interrogated in Section 3: Literature review.

3. Literature review

Much research has been carried out into the economic, social, cultural, and environmental impact of teleworking, including how changing patterns of travel and commuting alter the carbon emissions of teleworkers. CWSs are a relatively recent phenomenon, and so research into their environmental impact is more limited. The literature review proceeded in two stages. The first stage asked the research question “What are the environmental impacts of co-working spaces?”. Databases relevant to the built environment were searched with a combination of search terms relating to CWSs, including synonyms and alternative spellings. A total of 1,414 articles were

subjected to title and abstract screening. The final sample, following a process of backward and forward citation searching, is 19 papers. The literature review identified three themes present in the sample of papers, representing the main studied environmental effects of co-working spaces. They are transport, energy, and urban rehabilitation. The second stage of the literature review expanded the study to include demand responsive transport and residential self-selection. A similar process of database searching with title and abstract screening resulted in a sample of 11 papers on residential self-selection, and 8 papers on demand responsive transport. The results of both stages are presented below under the three dominant themes of transport, energy, and urban rehabilitation.

3.1 Transport

CWSs offer an alternative to both homeworking and employer office commuting. Energy savings from shorter commutes result when CWSs are located closer to an employee's home than the main employer office (Ohnmacht et al., 2020). However, these savings can be undermined in several ways. Cold starts (starting an engine when cold consumes more energy than starting an engine when warm) at the outset of commuting trips are unaffected by CWS working and consume large quantities of energy (Henderson and Mokhtarian, 1996). Users of CWSs may drive home or to local restaurants or cafes if the CWS does not have a canteen (ibid.). Extra leisure time enjoyed due to shorter commutes can be spent in energy-intensive activities including non-work-related travel (Hook et al., 2020). Part-time teleworkers may choose to live further from their employer office, resulting in net increases in travel given longer commutes on non-teleworking days (ibid.). Full-time rather than part-time teleworking was found to have greater levels of commute-related energy reductions (ibid.). Telecentres located close to employees housing promotes active and public transport options (Bieser et al., 2021).

Several studies noted the potential for mass adoption of remote working to have unpredictable impacts on the public transit network. Bieser et al (2021) noted that should TC be adopted on a society-wide scale, other systemic changes may occur (such as people choosing gyms and leisure facilities closer to their home, resulting in lower travel related leisure activities on HO days), which future studies could reveal to have

a significant impact on energy and transport systems. Henderson and Mokhtarian (1996) warn that an unforeseen consequence of mass uptake of centre- or home-based telecommuting could be a loss of revenue for transit operators, and a subsequent reduction in service capacity- possibly resulting in a return to car-use and a pro-car rebound effect.

In a study examining European neighbourhoods considered exemplars of sustainable mobility (strategies disconnecting transport from its harmful effects), best practice strategies for reducing car dependency were identified (Maltese and Mariotti, 2011). “Green corridors” of bicycle and walking pathways were a feature of all the neighbourhoods. Other common initiatives were the active promotion of car sharing/ pooling, provision of information on alternative transport options, and the inclusion of all stakeholders in strategy development through public fora/ websites etc. Areas where car use has decreased have reallocated parking space to green areas, playgrounds, and kitchen gardens.

Overall, the literature suggests CWSs can have a positive impact on lowering travel related GHG emissions, but not as significant as working from home exclusively. Ensuring CWSs are located on public transport corridors can enhance energy savings as users choose low-carbon transport modes.

3.1.1 Demand responsive transport

Where users live in excess of active travel distance limits from the CWS, providing public transport to reduce car dependency is a significant logistical challenge (Carroll et al., 2021). Dispersed populations, convoluted routing, aging communities, and subsidised passengers act as obstacles to the provision of regular services (Lakatos et al., 2020). Demand responsive transport (DRT) is a sustainable way to offer transit services to remote and dispersed communities, by offering an on-demand point-to-point transport service. Where DRT is provided, car dependency is reduced (Sihvola et al., 2012). DRT can offer particularly useful services connecting remote areas with other transit modes (Saxena et al., 2020). DRT services enhance social cohesion while offering a financially viable operation in remote areas. Employing a methodology involving the analysis of routes, passenger data, and costs, Lakatos et al. (2020)

developed an optimised DRT delivery template. By adopting a DRT delivery model, frequent unproductive detours were omitted from the service, resulting in decreased travel times, increased frequencies, reduced costs, and easier ticket purchase and trip demand procedures. In Amsterdam, a DRT system provided to replace a bus line in low density areas saw lower GHG emissions, vehicle km travelled, and operational costs per passenger, albeit with a significant reduction of passenger numbers, possibly due to the requirement to interact with the system via a smartphone, involving a level of digital literacy uncommon among older passengers (Coutinho et al., 2020).

Public reaction to DRT systems is mixed, with several usage barriers including poor performance expectancy and positive attitudes to private cars (König and Grippenkovén, 2020). A study of participation in local transit services provided by the Rural Transport Programme in Ireland found a reluctance on the part of older men in particular to avail of the service (Ahern and Hine, 2012), considering the service to be designed around female oriented priorities such as shopping trips. Older men who had lost the ability to drive regretted the accompanying loss of independence, and were reluctant to travel with other people, particularly on services mostly used by women. A lack of awareness of services was also problematic. Some older people refused to use the service despite suffering considerable isolation and lack of mobility in the absence of a car (ibid.)

Notwithstanding this, DRT offers a flexible, efficient, and cost effective means of offering public transit options to low density areas that fulfil the seven chief requirements of transit passengers, as defined by Walker (2011), as follows:

1. It takes me where I want to go.
2. It takes me when I want to go.
3. It is a good use of my time.
4. It is a good use of my money.
5. It respects me in the level of safety, comfort, and amenity it provides.
6. I can trust it.
7. It gives me freedom to change my plans.

Walker concludes all seven criteria are fulfilled by a frequent, easily booked, cost effective, clean, safe, reliable DRT system.

3.1.2 Residential self-selection

The promotion of CWSs in town and village communities by the Irish Government is envisaged as a means of allowing citizens to remain in and relocate to rural areas suffering population decline (Irish Government, 2021f). The pattern of settlement resulting from this shift will be key to realising emissions savings from the establishment of the CWSs, as the built environment and travel behaviour are interrelated, with density, sprawl, and urban planning influencing modes of travel, rates of exercise, and obesity levels (Cao, 2014). Recent research into residential self-selection explores how people choose where to live based on their travel needs and preferences (Mokhtarian and Cao, 2008, Cao, 2014). Studies have found transit availability can influence choice of residential location, with higher levels of satisfaction with travel (SWT) evident amongst those who choose to locate adjacent to a preferred transit mode (Cao and Ettema, 2014). Travel and location factors are found to be more important than neighbourhood characteristics in explaining SWT (Cao and Ettema, 2014). It is not always possible to select a residential location corresponding to one's transit preferences. When relocating from an urban to a suburban context, for example, increases in car use and decreases in public transport use are common (Scheiner and Holz-Rau, 2013). Associating residential self-selection theory with a mobility biography approach (which understands residential location to be influenced by biographical factors- family, employment, education), Scheiner (2014) describes a complex mixture of external and preference factors at play during residence selection.

3.2 Energy

Energy implications of CWSs are usually assessed as a contrast to working from home or at an employer office. Hook et al. (2020) examined the methodology and rigour of papers in this area and found that 26 of the 39 papers reviewed concluded that teleworking reduced energy use, with only 8 finding that teleworking led to higher, or a had a negligible impact on, energy use, with the most rigorous studies in the sample

generally finding smaller, if any, energy savings. Issues such as space heating of workers' homes and the expansion of information and communications technology (ICT) in homes and telecentres are not generally included in energy studies of telecommuting, which often ignore rebound effects.

These rebound effects are an increasingly important aspect of energy impact calculation studies. Vaddadi et al. (2020) examined if claims of teleworking sustainability are undermined by the energy costs of establishing and operating CWSs. The paper develops a conceptual framework of three layers of environmental impact of CWSs, as follows:

- i) "Technology: Required Infrastructure"- this layer describes the environmental effects of building and maintaining infrastructure required for CWSs- the premises itself, computer servers, parking spaces etc.
- ii) "Application: Working at the CW space"- workers energy requirements, including transportation, ICT equipment, furniture etc. This layer includes potential rebound effects- e.g., time and money saved by shorter commutes could be spent on energy-intensive leisure activities.
- iii) "System: Structural Change"- this layer considers the society-wide consequences of large-scale adoption of CWSs, including lifestyle change, land-use patterns, transit demand, and working culture.

The study finds that energy requirements of the CWSs themselves need to be countered by a reduction in energy consumption in the employer office, which could be achieved by desk sharing and/ or reducing the floorplate. Energy requirements associated with operating the CWS can counterbalance energy savings relating to commuting, so that CWSs should be accompanied by energy saving measures such as a net reduction of heated floor space in the employer office, at the worker's home, at the CWS itself. Investigating optimum strategies for heating open plan shared office spaces, Nagarathinam et al. (2021) found that a centralised system of assigning workspaces according to preferred temperature requirements of users was effective when used in conjunction with a smart programme capable of controlling the HVAC actuators centrally- considering naturally occurring dynamics in the temperature field (air flows near doors and windows for example) to allow maximum user comfort with

a minimum of wasted energy. The centralised approach was superior to intuition-based techniques of locating workers according to professed preference.

3.3 Urban Rehabilitation

CWSs represent a new urban typology. Trends in their choice of location, design, community impact, and urban regenerative potential are now being studied. Yu et al. (2019) defined two flexible work models of relevance to the current study- co-working spaces (where a diverse group of people work alongside each other and share a working space and resources, offering collaborative community opportunities) and digital working hubs (defined as a higher-tech counterpart of coworking spaces, offering the latest information and telecommunication technologies as well as traditional office facilities). Flexible work models and CWSs were found to promote the allocation of more workers to less congested regional areas, resulting in productivity gains. These benefits to smaller communities were also evidenced by Buksh and Mouat (2015), who found that digital hubs in Australia offered significant opportunities to improve local transport infrastructure, by altering commuting habits and diffusing populations. Identifying a geographical trend of certain areas becoming “brain hubs” of employment, with other becoming “brain drains”, from which knowledge workers typically depart, the report notes research by Moretti (2013) estimating that for each knowledge worker retained in a community, three to five service jobs are created. Co-benefits arising from CWSs in remote locations include increased social connections, networking, and economic opportunities, reduced travel times and ecological footprints (Buksh and Mouat, 2015). The calculated economic gains based on a 120-member hub with each member working an average of 3.5 days per week equate to A\$19.2m per annum for the local economy. This figure includes estimates for reduction in commuting, carbon emissions saved, and car accidents prevented (ibid.).

Studies have examined the criteria associated with location choice in new CWSs. Investigating 68 CWSs in Milan, Mariotti et al. (2017) found that CWSs chose to locate in areas remote from the city centre, to gain from lower rents and higher availability rate of office premises; often locating in vacant buildings such as former industrial and/ or commercial buildings. Reoccupying a vacant building is often the first positive

urban impact of a CWS. Jamal (2018) found CWSs were mostly located in historic downtowns (of mid-sized cities), citing a need to provide access to transit, a distinctive location in older buildings, and proximity to urban amenities. Several were found to have reactivated dormant real-estate in the downtown core. Some coordinated several funding streams, such as traditional financing, private donations, partnerships, and community bonds, to purchase and renovate large existing vacant buildings. In France, CWS users expressed a preference for centrally located, town centre spaces with good levels of public transport accessibility (Leducq and Demazière, 2021).

CWSs can stimulate urban economies in several ways. CWSs were found to initiate and contribute to evening/ night/ weekend activities in areas traditionally deprived of such events, while also contributing to the spontaneous agglomeration of services, clustering of creative businesses, reduction in vacancy rates, and increased street life (such as cultural outdoor events) in the areas in which they are located (Mariotti et al., 2017). CWSs facilitate new enterprises and community-based organisations, allowing them affordable office space in the downtown core, while also causing an increase in cash spends in downtown areas, supporting local small businesses and services (Jamal, 2018). These positive urban impacts are possible to encourage by public policy through funding streams to encourage bottom up CWSs and facilitating interaction between CWSs and other initiatives in the fields of culture, creativity, and social innovation (Mariotti et al., 2017).

Several studies have investigated ways in which local authorities can tap into the urban rehabilitation potential of CWSs. Zhao et al. (2020) examined how CWSs interact with the “Smart City” concept. This concept is defined as having four aspects: technical (technological infrastructure); socio-cultural (citizen engagement); political-institutional (government policy and support); and economic-business (business models and accountability). A major motivation among founders of CWSs was found to be community building and entrepreneurship. CWSs contributed to enhanced urban mobility and sustainability, in providing working locations close to users’ homes, reducing commuting rates and associated carbon emissions. Local authorities following a Smart City development programme can use CWSs to encourage social engagement and diversity, contributing to the urban social fabric and the Smart City

paradigm (ibid.). Bednář and Danko (2020) found that CWSs can be an effective tool for maintaining a dialogue between creative communities and local authorities, recommending public policies designed to stimulate urban development should be based on a systematic collaboration between CWSs, cultural amenities, and local authorities.

Culture-led economic development occurs in urban centres capable of attracting design, creative, and ICT workers, who contribute to town and city centre rehabilitation by occupying central buildings, supporting the local service economy, and stimulating the urban area's arts and culture scene (Bednář and Danko, 2020). CWS users and owners share a collective desire to change the attitude of their respective cities to arts, culture, and design, and see the establishment of CWSs as an agent of this change (ibid.) Managers of CWSs highlight the potential gains of local authority collaboration and public investment to maximise the transformative potential of these initiatives, with CWSs found to engage in cultural events such as lectures, exhibitions, and seminars, to stimulate cultural exchange with neighbouring communities (ibid.) A virtuous circle can be established in which the cultural content of neighbourhoods attracts like-minded businesses and cultural organisations, with CWSs enhancing cultural identity among communities- a key step in engendering culture-led urban regeneration (ibid.).

3.3.1 Community relations

Coworking spaces facilitate interaction both between users of the CWS and between the CWS and the community. Examining how the concept of proximity, as developed by Boschma (2005), applies to members and communities involved in CWSs, Akhavan and Mariotti (2018) found that CWSs can act as social and cultural hubs in the community. CWSs facilitate Boschma's five forms of proximity dynamics: i) cognitive (sharing of knowledge and expertise), ii) organisational (creation of networks), iii) social (friendship and collaborative structures), iv) institutional (established routines, rules, and laws), and v) geographical (togetherness in physical space). Expanding these proximity dynamics to the surrounding community is achieved by the involvement of the CWS in community outreach, cooperation with local services, sporting, social,

training, cultural, and charity events. The cumulative effects of these phenomena allow CWSs to operate as social and cultural hubs within their community.

In a related study, Akhavan et al. (2018) examine the interaction of CWSs with the Italian Social Streets movement, which involves communities in collaborative efforts to reclaim streets and public spaces as social spaces, reinvigorating social interaction among neighbours through social innovation. 19 CWSs were found to be in Social Street areas. In a case study of the Lambrate district of Milan, CWSs were found to engage with various initiatives spearheaded by the Social Streets local group, including programmes to reinvigorate the main square, promote local industrial heritage, and contribute to the creation of a creative environment conducive to knowledge workers to settle in the district. Striking a note of caution, in a study of CWSs in southeast England, Brown (2017) found little evidence of interaction between co-workers and local communities or other businesses. The study examined commercial CWSs which had no engagement policies, even when the CWS had public or semi-public social spaces (including galleries or community spaces) in or adjacent to the CWS. The authors found that interaction with local communities does not happen by chance and needs to be pro-actively developed by CWS operators/ users.

3.4 Conclusion

The literature review finds that CWSs can contribute to GHG emission reductions from work-related commuting, particularly in urban areas. CWSs can lead to lower levels of energy consumption if employers reduce the size and space heating requirements of their headquarters offices to compensate for absent workers. CWSs have been demonstrated to have a transformative effect on urban areas, stimulating rehabilitation of vacant or derelict built fabric, supporting local service economies, and contributing to a culture-led regeneration of neglected or brownfield areas. With the right planning, design, and governance, CWSs can achieve the goals established by government policy.

4. Primary research methodology

Primary research consists of a survey of CWS users and semi-structured interviews of CWS owners/ operators/ managers, with the aim of learning from Irish experience of

the CWSs' impacts on the environmental, social, and urban life of their host communities. The research design aims to gain quantitative insights into the impact co-workers have on the environment and local economies through the survey, and a qualitative understanding of the experience of hub operators in an Irish context through the interviews. The survey is an appropriate method to gather quantitative data on users' behaviours and attitudes, while the interviews allow a holistic investigation into operators' motivations and learnings through experience. Case studies of individual CWSs were not selected as a methodology as relevant information about a broad range of public and private CWSs was gathered during the interview process.

4.1 Survey

4.1.1 Overview

The survey examines the interaction of coworking space users with their surrounding communities and gathers quantitative data about the economic impact of the coworking spaces. By comparing economic activity generated by workers in centrally located CWSs as opposed to peripherally located CWSs, evidence was gathered relating to the increased economic benefits accruing from centrally located spaces. The survey is mixed method, using both qualitative and quantitative questions (Ponto, 2015). The survey builds on studies examining residential self-selection (Scheiner, 2014) and Demand Responsive Transport (Ahern and Hine, 2012). The survey was drafted to focus on three areas: the facilities available to the user of a CWS, their travel habits to and from the CWS, and their economic activity associated with the use of the CWS. The draft was subjected to a pilot test via expert assessment, whereby a specialist outside the research team was invited to review the study for methodological consistency and comprehensiveness, as recommended by Kallio et al. (2016).

4.1.2 Procedure

The survey was distributed to those coworking spaces contacted by the author during the research. Facebook groups aimed at the coworking community were contacted and permission was sought to share a link to the survey on their timelines. The survey

was shared on Twitter with relevant accounts requested to share the tweet. The tweet was shared by 21 accounts and viewed by 4,820 people. The survey was further distributed via a snowball effect as co-workers emailed the survey to their colleagues. The sample size is 41. The online survey was drafted on Google forms and consists of five main sections. Section 1 relates to the location and facilities available in the CWS, how the CWS interacts with the community, and the nature of the employment of the co-worker. Section 2 relates to the travel habits of CWS users, examining the transit modes used by co-workers in accessing the CWS. Section 3 examines preferences and attitudes of CWS users to public transport and active travel, examining if an appetite exists for more public or active transit facilities. Section 4 relates to the economic activities of CWS users. By examining typical spending habits among co-workers on workdays, the contribution of co-workers to the local economy is estimated. Section 5 gathers demographic data on age, gender, and nationality. The survey examines the differing impact on the social, cultural, and economic life of a town caused by peripheral CWSs compared to centrally located CWSs. The dependent variable is the location of the CWS relative to the centre/ main economic area of the town. The independent variables are the spending, travel, and cultural habits of the co-workers. Control variables consist of three demographics: age, gender, and nationality.

4.1.4 Analysis strategy

The survey data was interrogated to determine patterns of behaviour of CWS users, and how the location of the CWS impacts on these trends. The data was inputted to the SPSS software system for analysis and graph generation. In analysing the results, the author endeavoured not to extrapolate causality where unjustified by the survey data (Bertrand and Mullainathan, 2001).

4.2 Qualitative semi-structured interviews

4.2.1 Overview

A series of semi-structured interviews was carried out to gain empirical knowledge of the experience of existing coworking spaces in the Irish context. Semi-structured interviews were selected as an appropriate research method as they provide an opportunity to gauge expert opinion and lived experience, while involving versatility

and flexibility allowing a full range of sought and unexpected responses from participants (Kallio et al., 2016). When coupled with other forms of data collection (such as surveys), semi-structured interviews can contribute to a well-rounded body of information for analysis (Turner, 2010). Semi-structured interviews rely on a previous level of knowledge on the part of the interviewer, which is applied to the drafting of an interview template (Kallio et al., 2016). This template is used to guide the interview and ensure similar information is garnered from each subject, while allowing reciprocity between interviewer and participant, enabling the improvisation of follow-up questions and discussion (Kallio et al., 2016). While this flexibility is useful to satisfy the interviewer's thirst for knowledge in a subject area, it is unethical to gather information not completely necessary for the research (Kallio et al., 2016, Gibbs et al., 2007).

4.2.2 Procedure

Research to date informed the creation of an interview template. Questions were designed to gain a broad understanding of the character of the CWS as a workplace, its employees, its environmental policies, and any interaction existing between the CWS and the community. Questions were designed to be easily understood without being leading (Turner, 2010), and capable of being responded to with spontaneous, insightful, and vivid responses (Kallio et al., 2016). The template was structured to include main themes along with follow-up questions, in a logical progression. A field-test was carried out with a potential study participant, to ensure relevance and intelligibility of questions, and appropriate question order and time limits. Participant sampling was aimed at gaining a range of voices distributed among existing CWSs geographically and among size, age, and category of CWS. 30 CWSs listed on the website coworking.ie (Coworking, 2021) were approached by telephone and email, with 16 agreeing to be interviewed. The sample contains CWSs from 11 counties in the Republic of Ireland, with ROI CWSs chosen as most relevant to the policy context of the study. The CWSs are located in urban and rural locations of various scales (see Table 4). The sample contains 7 publicly funded CWSs and 9 private CWSs. Interaction with participants was professional and consistent with the ethical procedures established in the UCD ethical review. Participants were asked to return a signed copy

of the Informed Consent Form before the interview commenced. Interviews were conducted online via the Zoom platform, with automatic transcripts and voice recordings generated by the website Otter.ai, running simultaneously. During interviews the author remained as neutral as possible, endeavoured to stay on topic throughout, limited visible notetaking (so as not to lead the subject with implied enthusiasm for responses), and asked one question at a time; all as recommended by Turner (2010). The interviews averaged 30-40 minutes in duration.

4.2.4 Analysis strategy

The automatically generated transcripts were proofread to ensure accuracy and entered into the NVivo software to be coded. The coding process identified themes and trends, including recurring expressions, ideas, and phrases, in the responses, which form the basis of the analysis of interview data (Turner, 2010, Kvale and Flick, 2007).

5. Results

5.1 Survey

The survey sample is 41 respondents, with demographic information gathered on age, gender, and nationality (Table 2).

Variable	Response	No. (%)
<i>Gender</i>	Female	13 (31.7)
	Male	28 (68.3)
<i>Age</i>	18-30	12 (29.3)
	31-40	11 (26.8)
	41-50	9 (22)
	51-60	6 (14.6)
	61-70	3 (7.3)
<i>Nationality</i>	Irish	35 (85.4)
	Non-Irish EU citizen	5 (12.2)
	Non-EU citizen	1 (2.4)

Table 2: Demographic breakdown of survey respondents

5.1.1 Information on the users and CWSs

Respondents were asked about the nature of their use of CWSs and the facilities available at the CWSs. 34.1% of the respondents are self-employed, 7.3% describe themselves as freelancers, 34.1% are owners or employees of a business operating

out of the CWS, and 22% are remote workers. Respondents were asked to self-identify whether the CWS is located centrally in their town/ village, or peripherally (in an industrial estate, at the edge of town, or in a non-urban area). 63.4% of respondents selected central, while 36.6% selected peripheral. Asked what facilities are available in/ at the CWS, 51.2% confirmed vehicle parking availability; 51.2% bicycle parking; 48.8% locker/ storage for personal use; 36.6% shower facilities; and 92.7% kitchen facilities. When asked what activities occurred at the CWS (currently or before Covid restrictions were introduced), 34.1% confirmed arts events accessible to the public are/ were available; 65.9% lectures and seminars; 51.2% training programmes; 14.6% Yoga and fitness events; 24.4% weekend events for CWS users, 7.3% weekend events for the public; and several other uses were submitted, including book clubs, drawing classes, networking events, tech meetups and business and promotional events. Only one respondent (3% of total) reported no public access to the CWS.

5.1.2 Mode of travel

The mean distance to the CWS from respondents' homes is 13.73km, with a mean commute time of 25.61 minutes. Respondents were asked to identify their mode of travel to the CWS (Fig. 1). The responses indicate active travel and public transport are more common among CWS users than the public, when compared with census data (CSO, 2021). In 2016, 61.4% of census respondents indicated they drove a car to work, compared to 48.8% of survey respondents. In the census, 9.3% of people travelled on foot, compared to 17.7% of survey respondents; 3% travelled by bicycle (17.1% of survey respondents); and 5.9% by bus, minibus, or coach (9.8% of survey respondents). Only the train/ DART/ Luas category showed a decrease between the survey respondents and the census (2.4% and 3.4% respectively), reflecting the geographic locations of the CWSs, remote from urban public transport arteries.

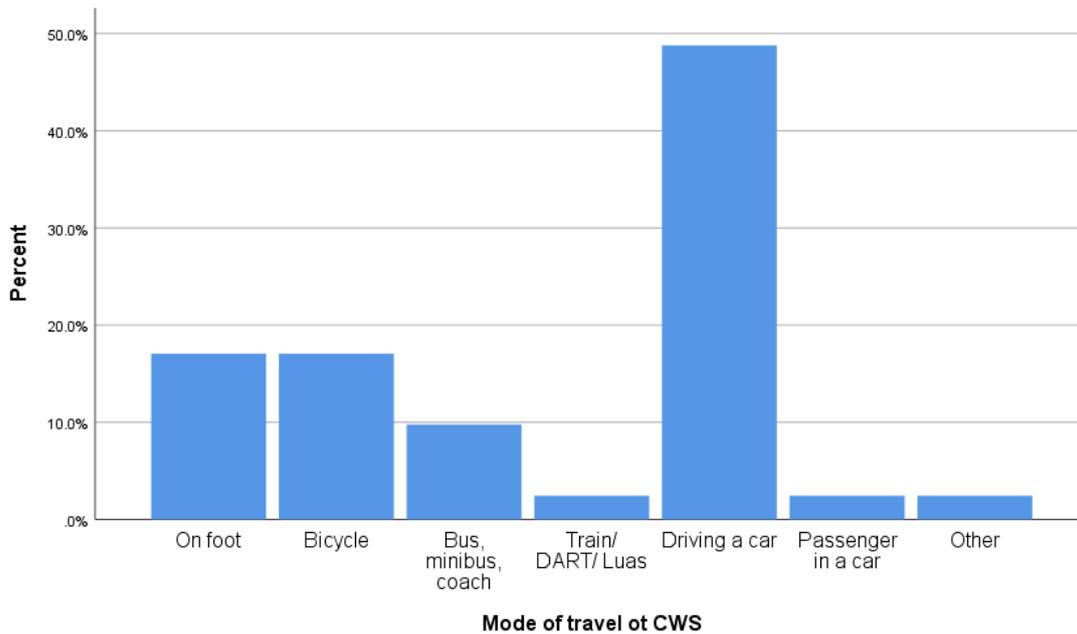


Fig. 1: Mode of travel to CWS

A significant difference was identified between modes of travel adopted by users of self-identified ‘central’ CWSs and ‘peripheral’ CWSs. For central CWSs, 26.9% travel on foot, 19.2% by bicycle, 11.5% bus, minibus, or coach; with 34.6% driving to work. For the peripherally located CWSs, these figures are 13.3% on foot, 0% bicycle; 6.7% bus, minibus, or coach; and 73.3% drive.

5.1.3 Residential location

Respondents were asked to identify any way in which the availability of a CWS has affected their residential location. 12.2% of respondents reported that the availability of a CWS has allowed them to relocate to their current place of residence. 9.8% of respondents reported that they would feel pressure to leave their current place of residence for employment opportunities were it not for the availability of the CWS. 9.8% of respondents would like to relocate closer to their CWS. 14.6% would consider moving to another location provided a CWS was available. 63.4% reported that the CWS has not affected their place of residence. When invited to submit comments on CWSs and residential location, one respondent stated:

[The CWS] has allowed me to return from the UK and work effectively remotely. It’s fantastic!

5.1.4 Preferences and attitudes to public and active travel

Respondents were asked to what extent they agreed or disagreed with a series of statements relating to active travel and public transport.

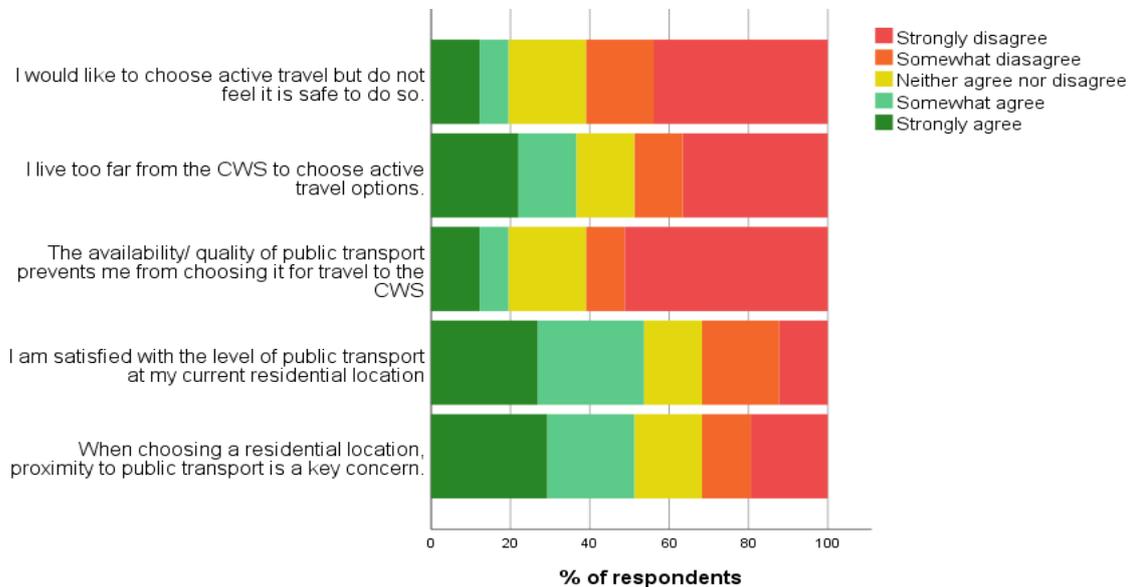


Fig. 2: Preferences and attitudes to active travel and public transport

The results indicate that a proportion of CWS users are interested in choosing active travel and/ or public transport, but face obstacles in doing so (Fig. 2). 19.5% of respondents would like to choose public transport but feel the quality/ availability of services prevents them from doing so. 19.5% of respondents also expressed an interest in choosing active travel, but do not feel safe in doing so. 36.6% of respondents are interested in active travel, but live too far from their CWS to choose this option. Respondents were invited to offer opinions on public transport and active travel, with a range of contributions from hostile to supportive (Table 3).

Question/ Topic	Sample responses
<i>If you have any comments on public transport availability at your home and/ or CWS, please give details.</i>	<ul style="list-style-type: none"> • Buses are driven too violently to read/ work whilst in transit; car is a mobile office • My preferred method of transport is my own car that I pay for. • Cars dominate [my area]- car parks, wide roads, narrow pavements. • There is a bus route from the CWS to my home, but it is infrequent and disappointing, as it does not always operate. It's uncomfortable as because every day I bring my heavy laptop, lunch box and umbrella with me. • Public transport does not bring you to your destination. It is unreliable. The routes just go to the city centre.
<i>If you have any comments on active travel to/ from your CWS, please give details.</i>	<ul style="list-style-type: none"> • No. 1 reason for not cycling is bike will be stolen. No. 2 reason is car offers privacy for calls and meetings not available in CWS. • Cycling is only dangerous because not enough people do it. • I like to travel by bike and keep my carbon footprint to a minimum. • Cycling should be encouraged way more! • I'm scared of bus lanes and crazy drivers who use them even when they are not allowed to. I have seen lots of accidents with cyclists when cars are turning left. • I cycle with my son to his primary school and then cycle from there to my CWS. • Some cyclists are more dangerous than cars, especially those who put their head down without looking where they are going. • Bicycle parking is uncovered and not secure.

Table 3: Survey responses relating to public transport and active travel.

5.1.5 Economic activity

Respondents were asked about their economic habits relating to attending the CWS, including their frequency of buying lunch or coffee in neighbouring businesses, and their frequency of engaging in various recreational and economic activities after work. The results were compared for central and peripheral CWS locations.

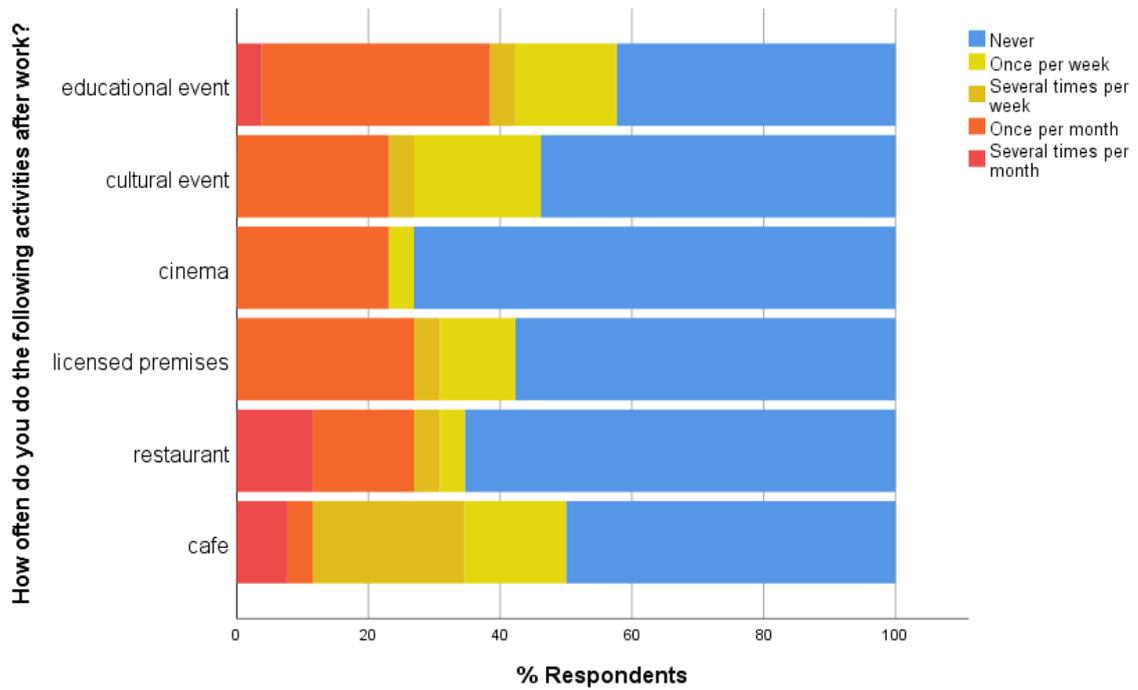


Figure 3: Frequency of engaging in after work activities: 'Central' CWS locations.

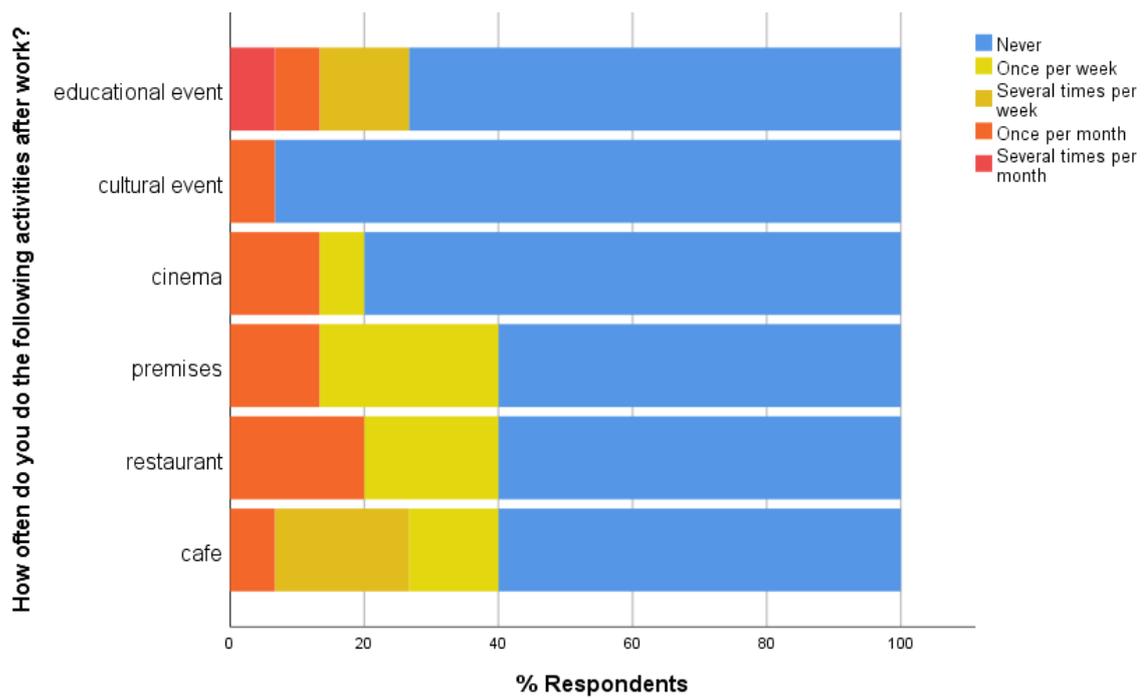


Figure 4: Frequency of engaging in after work activities: 'Peripheral' CWS locations.

Users of centrally located CWSs engage more frequently in 5 of the 6 recreational activities (Figures 3 and 4). There is a particularly large difference between numbers of users engaging in cultural and educational events in both categories. Differences were also seen in numbers of times per week respondents reported buying lunch or

coffee in a neighbouring premises. For central CWSs, the mean number of lunch purchases per week is 2.88, while peripheral CWS users report a mean of 1.6 purchases. Coffee purchases per week for central CWS users are 2.57, with 1.93 for peripheral CWS users. The average spend on lunch purchases is €8.01, with the average spend on coffee purchases €4.32.

5.2 Qualitative semi-structured interviews

The 16 semi-structured interviews included participants ranging from urban to rural and from private to public CWSs. The participants were asked what lessons they have learned and what challenges they face in the operation of the centres. Table 4 gives a breakdown of the demographics and general information about the participants and their CWSs. Table 5 summarises the key themes of the questioning and the main findings, with sample quotations relevant to the study.

Variable	Detail	No. (%)
<i>Gender</i>	Female	3 (18.75)
	Male	13 (81.25)
<i>Position</i>	Founder	9 (56.25)
	Manager*	4 (25)
	Coordinator**	3 (18.75)
<i>Category of CWS</i>	Private	9 (56.25)
	Public- standalone CWS	2 (12.5)
	Public- enterprise centre	5 (31.25)
<i>Location of CWS***</i>	Village (<1.5k pop)	3 (18.75)
	Small town (1.5- 5k pop)	7 (43.75)
	Medium town (5-10k pop)	1 (6.25)
	Large town (10-50k pop)	3 (18.75)
	City (50k+)	2 (12.5)

*Manager category does not include founder

**Coordinator includes administrative/ promotional roles such as Business Development Manager

***Settlement size categories based on Des McCafferty's study *50 Years of Urbanisation in Ireland* (McCafferty, 2019)

Table 4. Summary of interview participants (N=16)

Main question	Key themes and No. (%) responses	Examples (quotes)
<i>What was the main original purpose of establishing the CWS?</i>	Community/ public initiative: 7 (43.75) Private enterprise: 9 (56.25)	<ul style="list-style-type: none"> • <i>I was running a business from my kitchen table, I was feeling isolation, and I thought I have an empty building...I invested my funds into the town's first coworking hub.</i> • <i>We are a small community group whose overall vision is to create viable, well-paid jobs in the area.</i> • <i>Coworking wasn't something we intended to do but funding became available to renovate an unused area of the premises.</i>
<i>How was the CWS building/ premises chosen?</i>	Building was in ownership of operator: 5 (31.25) Building was available to buy: 2 (12.5) Building was available to rent: 6 (37.5) Building was purpose-built: 3 (18.75)	<ul style="list-style-type: none"> • <i>The building had been pretty much abandoned for 10 years prior. To brand it we gave it a rather exceptional paint job, something the town was not used to.</i> • <i>We are an enterprise centre, so were built with own-door units in mind, with a small area set aside for hot-desking. We watch our pricing and keep our units small so that as businesses expand, they move to other premises. We don't want to displace businesses who would otherwise be on the main street.</i>
<i>What range of services does the CWS provide?</i>	Open plan CWS: 16 (100) Private offices: 11 (68.75) Podcast/ broadcast studio: 3 (18.75)	<ul style="list-style-type: none"> • <i>We have three start-up units, a business centre with two trading rooms, the boardroom with visual aids, teleconferencing, several serviced offices, and a coworking space with hot desks.</i>
<i>Has the CWS received any public funding?</i>	In receipt of public funding at foundation: 7 (43.75) In receipt of public funding since foundation: 7 (43.75) No public funding: 2 (12.5)	<ul style="list-style-type: none"> • <i>If you're state-sponsored, then a CWS will work for a period of time, it'll only work as long as the sponsorship comes in- so unless you have a solid business model for it to work without sponsorship, it would eventually shut up shop.</i>
<i>Does the CWS facilitate active travel for co-workers?</i>	Facilities available on-site: 4 (25) Facilities on-site in planning/ development: 2 (12.5) Facilities locally: 5 (31.25) No active travel facilities: 5 (31.25)	<ul style="list-style-type: none"> • <i>We have secure bicycle parking, and showers are part of our next phase.</i> • <i>We are looking to put in bicycle racks. What we would really like is a public bikes scheme as we are close to the train station. I don't have showers because of the insurance risk.</i>
<i>Does the CWS have strategies for reducing energy use?</i>	Low energy strategy in operation: 6 (37.5) Low energy strategy in development: 5 (31.25) No low energy strategy: 5 (31.25)	<ul style="list-style-type: none"> • <i>It wasn't something we thought of initially but certainly it's on the agenda now. We'd be an ideal candidate for solar energy as the hours of business are the hours of sunlight.</i>
<i>Is the CWS available for community uses/ events?</i>	Yes, free, or nominal fee, for community events: 11 (68.75) Yes, mostly revenue raising: 4 (25) No: 1 (6.25)	<ul style="list-style-type: none"> • <i>We're a good resource for community groups who want to discuss issues about the village privately without tongues wagging.</i> • <i>We had a gig with a young musician from the States; we passed around a hat for him and each user came with a couple of new people who we hadn't met before.</i>

Table 5: Summary of interview data

5.2.1 Motivation and outcomes

The participants were asked what factors motivated the creation of each CWS, and what outcomes in relation to these motivations had been realised since the CWS became operational.

Motivation

The sample includes 9 private CWSs, operated as for-profit businesses. 8 CWSs are publicly funded spaces arising from community/ institutional or Local Authority initiatives. The private operations ranged in intention. Some entrepreneurs were keen to bring the CWS phenomenon they had witnessed internationally to their hometown or city, along with an urban lifestyle not commonly found in Ireland.

Being based in the town centre provided the [right] working environment- people can walk and cycle, they can go to the café, they can drink wine or beer on the river front. It was that concept that I wanted to bring to the town, to show that it was possible.

Others had buildings that were available, and CW was selected as an appropriate venture, having examined various commercial options. Some smaller private CWSs began as a means to share office costs for start-up businesses, or to create a conducive environment for the owner themselves to work. Public CWSs originate in community groups, Local Authority initiatives, or regional development agencies. A common motivation is the desire to retain young populations in rural areas, and to diversify employment opportunities in an area. Often, publicly operated CWSs are co-located with enterprise centres, offering a wider range of facilities than are generally found in stand-alone CWSs, including own-door office suites, mentoring and training. One operator of an enterprise centre described the role of the centre as follows:

I suppose our objective is to provide hot desks, dedicated desks, and incubation spaces for seeds and start-ups, but we're also there to provide other business supports, such as mentoring, guidance, funding, networking, and growth opportunities. We help users with websites, put them in touch with suppliers, and get them access to funding.

Outcomes

The aims of CWSs in improving employment opportunities and diversity in their geographic areas have largely been achieved. Examples were given of CWS users working as freelancers or remote workers who were able to remain in their location due to the presence of the CWS. Workers changing jobs are taking advantage of the opportunity of working remotely for the first time. Participants reported CWS users relocating to the area of the CWS from larger cities, particularly Dublin, and from abroad. Relocating workers can save money through reduced costs of living including accommodation costs, often while retaining their salary at the same rate.

What has emerged over the last 18 months is that people are coming home to remote work. It's not a benefit anymore, it's mainstream; it is the normal way to work, whether it's complete remote working or hybrid remote working, and people are trying to do it as much as they can.

In tourist areas, tourists are now regularly using the CWS during their holiday, and can extend their stays, sometimes by several weeks, due to the availability of the CWS. Families can take a three-week holiday, with both parents on leave in week one, one in week two, and the other in week three, with each parent spending one week in the CWS.

5.2.2 Location

The participants were asked what factors determined the location of the CWS. The location of a CWS can impact its range of co-benefits, as centrally located CWSs stimulate more economic and cultural activity than peripheral CWSs (see Section 5.1 above). The location can influence travel and settlement patterns, and levels of community engagement. Participant detailed four scenarios in which the premises was either bought, rented, purpose built, or already in the ownership of the operator. The nature of tenure of a premises impacts management and operational strategies.

Premises in ownership of operator of CWS

In cases where the CWS operates from a premises owned by the operator, choice of location was not a factor in the creation of the CWS. The creation of a CWS often

followed a business model investigation of possible uses for empty or underused buildings. One CWS in a large town centre building, vacated by its previous single office tenant, is now operated in conjunction with other retail and hospitality businesses in the space, creating a mixed-use commercial centre on a prominent town centre street. Some of the public coworking spaces are in buildings owned by Local Authorities and Community Development agencies, wherein office accommodation is provided in buildings that had often been underused or vacant and are now contributing to an area's economic life. Owning the premises is advantageous as control is maintained over how the space is accessed, used, decorated, and operated.

Premises purchased for use as CWS

Two of the participants reported their premises had been purchased for the CWS. Both premises were empty or semi-vacant office buildings dating from the 1990s to the 2000s. Both are town centre properties and both owners are enthusiastic about providing an urban lifestyle to their users, being located among the commercial heart of their towns. The buildings' HVAC systems were upgraded, and the offices fitted out in the fashionable style popularised by Google and Facebook.

We stripped out all the suspended ceilings and went for an open plan look. The benefit is it looks modern and creates space by raising the ceiling height by up to 2m, creating a brighter, lighter space. It's also substantially cheaper to do these industrial style fitouts, so the drivers are economic as well as design.

Premises rented for use as CWS

Rented spaces can be problematic for housing CWSs. Operators reported being frustrated by the control of building services and fabric remaining with the landlord. Flexibility in terms of energy retrofit and building access can be lacking. Where a premises is rented, its location and built form may not be ideal for the project. In some cases, however, landlords were found to be cooperative in proposals to operate a CWS in some or all of a rented property.

Premises purpose built for use as CWS

Three of the CWSs are housed in purpose-built accommodation. Each of these consists of a CWS as part of an enterprise centre, with other business incubation and small premises on-site. None of the purpose-built centres is in a town centre, with car parking and room for expansion cited as advantages of their peripheral location. Participants operating from purpose-built spaces were asked if they would alter the design based on experience of the space in use. One participant noted how difficult it is for institutional builders to decorate and fit-out the space in sufficiently atmospheric way to attract entrepreneurial users, and to facilitate social and collaborative synergies when the building is in use:

If you haven't got a [design] background, what you end up with is breezeblock walls, everything painted white, like going into a doctor's surgery. Now [after a process of redecorating over time], we have a space in which people can feel relaxed, they can chat to each other, have good coffee and good tea. When you're building a building like this, you've got to think about community, so, where do people meet? Where do they hang out? Where do you force them together- what we call collision points? So, you have only one printer, and only one kitchen or canteen, despite the fact you have three floors. That's how you make the users connect.

Aspirations for ideal premises

When asked what their ideal premises would consist of, participants fell into two groups. The first (mostly private sector) group sought charismatic buildings (old mills/ industrial units), in a central location close to cafes, restaurants, and services, hoping to engender a lifestyle that some operators had become familiar with having worked in CWSs in other countries.

I can see the benefits of having refurbished buildings in the town centre to improve people's lifestyle by being in your office, then going out walking to a café next door and then walking back to your apartment where you live.

The second (mostly public sector, enterprise focused) group prioritised flexibility and space for expansion, along with car parking. This group was reluctant to limit themselves to town centre sites as they envisaged space constraints inevitably arising. They offer a larger range of services which can be hard to facilitate in a historic or spatially constrained town centre building.

5.2.3 Social, urban, and environmental impacts

Interview participants were asked to outline the impacts the CWS has had on its social, urban, and environmental context. This series of questions aimed to identify co-benefits accruing from the CWSs (Fig. 5).



Figure 5. Diagram of co-benefits identified in the research.

Social

Both public and private CWSs make their premises available to community groups and cultural initiatives, with only one of the spaces reporting no community uses. Often the spaces are rented at nominal fees to cover lighting and heating costs, or free of charge at the operator's discretion. Four CWSs reported community uses as an important revenue generating function. Some spaces are made available to school students who cannot study at home due to lack of Wi-Fi or other issues. The various community uses CWSs have been put to are listed in Table 6.

Networking	Cultural	Community	Sport	Other
Founders Friday	Art exhibitions	Christmas fair	Sports clubs' AGM	Charity coffee mornings
Lunch & learn	Guest lectures	Political Q&A	Slimming World	CoderDojo
Tech meetup	Music gigs	Community education	Sports clubs' meetings	Student study sessions
Tax advice clinic	Arts & literature festivals	Counselling services	Yoga classes	Chamber of Commerce

Table 6: Variety of community uses reported by interview participants

Operators report high levels of social interaction between users, often engendered by management strategies. This interaction leads to collaborations and new business ventures. Networking between users is one of the chief attractions of working in a CWS, and the resulting business ventures contribute to the financial resilience of the users and their communities.

Urban

Several CWSs reported an increase in economic activity among neighbouring commercial units. Some vacant units became operational following the opening of the CWS. Survey research confirms a pattern of discretionary spending among CWS users in local businesses (see Section 5.1.5 above). These effects are greater in CWSs located centrally in their towns/ villages. Some CWSs are in historic or heritage buildings, including protected structures. The reuse of heritage or vacant properties is a key component of town rehabilitation (Crowe et al, 2020). CWSs represent an opportunity to reuse buildings in an economically productive way, as their use both occupies a building and stimulates the local economy. Operating from an old premises can bring

management and operational challenges, given the maintenance demands of aging buildings (see Section 5.2.4 below).

Many coworking spaces have installed or plan to install AV facilities, Zoom rooms, broadcasting suites, and smart communications technologies that allow the facilities to be used for a variety of uses including conferences and TV studios. The adoption of these technologies can allow the CWS to play an active part in the move towards a localised economy, as previously centralised events such as major conferences, can now occur over several locations, with a cluster of attendees gathering in the CWS. Increasing numbers of technology-based enterprises can locate anywhere a suitably equipped CWS is present.

Environmental

A majority of CWSs interviewed have a low-energy operations policy either in operation or in development. In terms of building fabric, owners of spaces are keen to reduce energy use for heat and light for both economic and environmental purposes. LED lighting with responsive controls is in place in several CWSs, with one CWS employing a strategy to conserve power overnight by shutting down all electricity at 8pm, unless a waiver has been secured by a specific workstation.

Active travel is provided for, by way of secure bicycle parking and/ or shower facilities, in 25% of the CWSs, and under development in a further 12.5%. Among the other CWSs, some are in small town centre premises with no outdoor space for bicycle parking, however facilities are available on-street. Some rural CWSs are in low-density areas where travel distances are too great for walking and cycling, or in exposed locations where active travel is unfeasible given climate and distance conditions. These CWSs will rely on improved rural public transport provision to lower their commuting related GHG emissions.

5.2.4 Key challenges

Economic

A common theme among the private CWS interviews is a desire for relief from commercial rates, both in pandemic and non-pandemic times, and a reduction in the

VAT rate, on the understanding that a CWS provides a service rather than real estate rental (which is the basis for the current VAT system).

Our biggest overheads are rates and VAT. We have to pass on these charges to our co-workers, therefore it's making it more expensive for them to rent space, even though they're helping the local economy. We pay 33% VAT as we are considered landlords, whereas as a service I think we should pay 13.5%.

Private CWS operators often co-locate additional revenue-raising streams with the CWS, in the form of retail/ café/ service providers. Renting the space commercially is another option to increase the viability of the business.

Built fabric

Buildings occupied by CWSs dating from the 1850s to the 1970s were reported to be challenging to maintain and operate. Protected structures can be expensive to maintain and use, as their protected status limits the range of possible interventions. Replacing windows in a protected structure involved sourcing replacements from a specialist window manufacturer which added significantly to the cost. Older buildings also had limited accessibility, inefficient HVAC systems, and fire safety compliance issues. Notwithstanding these problems, operators reported user satisfaction with the character of older premises.

Funding

7 of the 16 CWSs interviewed were publicly funded at their inception, with 7 more of the CWSs receiving grant funding since commencing operations. This includes funding from Enterprise Ireland, LEADER funding (Irish Government, 2021d), Regional Development Boards, Udarás na Gaeltachta, and recently through the Connected Hubs programme. Funding has been made available from Enterprise Ireland for Covid-19 mitigation measures (Enterprise Ireland, 2021). Connected Hubs funding has been announced for many of the hubs, with projects including provision of private offices, upgrades of lighting and energy systems, upgrades of building access and automation systems, upgrade of AV systems, installation of EV points for electric vehicles, installation of outdoor workbenches with USB connectivity, creation of private phone

call booths, and creation of broadcast studios (Irish Government, 2021a). While the CWSs welcomed the funding allocations for capital projects, a common theme in the interviews is the lack of resources for staff. Private CWSs generally cannot provide an on-site manager, as the salary of a permanent member of staff would exceed the operating profit. Some CWSs have worked around this in creative ways, for example by assigning one user as an “ambassador”- a role that allows them to welcome and orientate new users in return for a discount on their fees.

We have a what we call an ambassador on site- that person gets a percentage of the hot desk rental income, and a bonus on the dedicated desks, and they get their desk for free. They work mostly on new lettings, showing people around, which prevents us having to cover the salary of a manager.

Skills and expertise

The interviews revealed that public and private CWSs have differing strengths and weaknesses. Public CWSs have funding and costs advantages. Private CWSs understand entrepreneurialism and can facilitate the business requirements of their users in a proactive manner. Some of the CWSs interviewed combined these strengths by employing private sector expertise to guide and manage a publicly funded CWS. The result is a marriage of the funding and facilities advantages of the public CWSs, with the business and management expertise of the private sector. The roles varied in title, including Business Development Manager. Typically, these staff are employed on a short-term contractual basis and are recruited from outside the public sector.

When someone is tasked with overseeing the building of a centre, they generally have a facilities manager skillset. They get things done, but they very rarely have an entrepreneurial or business background. In operating a hub, you’re looking for a totally different skillset, linked to the events and hospitality industry, and empathy and understanding of what entrepreneurs are going through. So, in a manager you’re looking for three very different skillsets, and it’s hard to find them in one person. [Hiring someone with these skills from the private sector] is a

happy medium. If we're going to bring people into the space and have them benefit the community, it needs to be hosted and coordinated, it won't just happen on its own.

6. Discussion

The study identifies the co-benefits accruing to communities from the establishment and operation of coworking spaces, focusing on three main areas: social, urban, and environmental impacts. The literature review, survey, and semi-structured interviews each shed light on these areas, with findings relating to best operational practice and proposed policy instruments summarised in this section and in Table 7.

6.1 Social

CWSs can stimulate connections among users, and between CWS users and the community. There is evidence of CWSs playing formal and informal roles in community building, facilitating events for groups involved in cultural, charitable, community, and sporting activities. The primary research finds multiple interview participants, from both the public and private sector CWSs, using the CWSs for a broad range of community purposes, often at minimal or no charge to the groups. This capacity of CWSs to play an active role in the life of the community can be encouraged and facilitated through a proactive management policy. Interactions between CWS users, and between users and the community, expand the networking and collaboration opportunities of users. Pro-active events management and networking strategies can be adopted to facilitate these encounters. Social outcomes are dependent on a level of effort on the part of operators to engender interactions and synergies. Funding restrictions and lack of awareness of the necessity of dedicated staff for this purpose means many CWSs are failing to achieve their full social impact.

Policy recommendations

- Funding streams for personnel as well as capital investment should be considered by central government. Many opportunities for promotion and expansion of CWSs in both the private and public sector are being lost due to lack of availability of manpower and suitable skillsets. Business Development

Officers recruited from the private sector and employed on a contractual basis for a set number of years have proven successful in overhauling and developing service provisions and outcomes in public CWSs.

- All CWSs should be provided with information on best practice managerial strategies to facilitate, encourage, and develop networking and business expansion opportunities for the CWS users. Information and training can result in CWSs being proactive rather than reactive in their management and operations.
- Local Authorities and Third Level educational institutions should collaborate with CWSs as a potential location for community, outreach, and educational events.

6.2 Urban

The research finds evidence that the establishment of a CWS can stimulate urban rehabilitation. CWSs help to revitalise districts, support culture-led urban rehabilitation, create communities of knowledge workers, support service economies in towns, and encourage residential activity in town centre areas, reducing commuting levels and increasing the appeal of host areas for workers and visitors. Some CWSs are located in protected structures/ heritage buildings. Revitalising these buildings is an important part of rehabilitating towns, as activating historic properties improves the town's self-image, retains the embodied carbon in the structure, contributes to street life and economic activity, and broadcasts a positive image of renewal. The maintenance of these properties can be a significant drain on the resources of the CWS. Assistance should be offered at official level to CWSs taking on these buildings. The type of tenure of a CWS affects its management flexibility, with higher control of access, HVAC systems, and usage in owner-occupied premises. CWSs can play a role in the development of local economies, stimulating economic activity among users in local service providers. CWSs located in central rather than peripheral areas are shown to generate more economic and cultural activity among users. A technically resourced CWS can facilitate distributed events, stimulate small scale economic enterprises, and network local producers. These capabilities increase community resilience.

Policy recommendations

- To generate a creative dynamic between coworking spaces and local communities, policymakers should establish multi-stakeholder relationships to encourage and promote CWSs in their most beneficial form, maximising the urban co-benefits these spaces make possible.
- Where maintenance and adaptation of protected structures is undertaken by CWS operators, financial assistance through heritage grants or similar funding should be made available, given the public benefits resulting from the active use of these buildings.
- Levels of commercial rates and VAT should be reviewed for CWSs, as prohibitive costs can undermine business models for private CWSs. Lower overheads will allow a wider range of CWSs to become viable.

6.3 Environmental

CWSs can result in positive environmental outcomes in relation to transport and energy use. GHG emissions savings from shorter commutes for CWS users are possible with adequate supports for active travel and public transport. Almost half of CWS users surveyed travelled to the CWS by car. The survey reveals a preparedness among some co-workers to engage in active travel or use public transport, but reservations about service provision and cycling and walking infrastructure prevent them from doing so. Workers relocating to rural areas to work in CWSs may inadvertently add to their carbon footprint if their new place of residence requires a car commute. To avoid this, planning bodies should ensure CWSs are located in central areas adjacent to public transport. Demand Responsive Transit can facilitate co-workers who cannot self-select a residence close enough to the CWS for active travel. CWS workers utilising local transport can help reduce the stigma associated with its use in certain cohorts such as older men. Ideally, CWS users will live within an appropriate distance to the CWS to walk or cycle to work. Initiatives to rehabilitate vacant housing in town centres, and to provide serviced sites for house building within towns, can help new members of the community self-select a residential location that facilitates a low-carbon lifestyle.

The operation of CWSs involves energy use for space heating, cooling, ICT operations, lighting, and kitchen facilities. For this energy expenditure to represent a net reduction in energy over working from home or employer-office, reductions in energy use are required in those locations. Doubling up of ICT requirements also uses energy, although energy savings from short commutes can compensate for the setting-up and maintenance energy requirements of CWSs. A majority of CWSs interviewed have plans for low energy management and retrofit of their premises. The appetite for low energy operations evident from the research should be facilitated by the provision of practical advice and, where necessary, funding by Local Authorities and central government. The investment in major capital items such as solar panels is under consideration by several of the CWSs contacted (with participants noting the complementarity of hours of operation of solar arrays and CWSs). However, lack of expertise and funding is preventing some plans being realised, with a fear that partial advice might result in the installation of a system that becomes obsolete or fails to deliver the economic and energy advantages desired. CWSs can integrate into community power generation, district heating, recycling, and composting schemes to further contribute to communal sustainability and resilience.

Policy recommendations

- Local Authorities should require planning applications for CWSs to be located along public transport corridors. Proposals for CWSs should be sited as close to the centre of towns and villages as possible. Central locations stimulate increased economic activity in surrounding businesses, increased levels of active travel and public transport use, and increased cultural and educational engagement by CWS users.
- Local Authorities and government agencies should offer impartial advice about energy upgrades such as solar PV, to encourage greater uptake of capital investment in low- and renewable-energy systems.
- Facilities for active travel should be provided in the vicinity of CWSs as part of active travel provision for towns and villages. CWS users who feel safe while cycling will choose this option when provision is made. Operators of CWS should provide bicycle parking/ showering where space permits.

- Measures to encourage town-centre living, such as a renewed ‘Living over the shop’ scheme, grants, assistance for the refurbishment of vacant properties, and the provision of serviced sites in urban areas to reduce demand for one-off rural housing, will contribute to the sustainable settlement patterns of relocating workers.

Category	Level	Co-benefit
Social	Basic	CWS as hub for community events <i>Facilitate on-site cultural, community, and educational events for public and users of CWSs. Operators can use this as a revenue-raising and/ or promotional strategy.</i>
	Intermediate	CWS as generator of collaborations and networking <i>Use the interior design and layout of the CWS to encourage chance encounters and social interaction of users in a convivial setting. Assign or employ a “catalyst” to coordinate suitable events, such as Pecha Kucha evenings.</i>
	Advanced	CWS as driver of regional enterprise <i>Provide government funding for more CWSs to employ Business Development Officers or similar roles, to coordinate social, networking, enterprise, community, and managerial aspects of CWS operation and expansion.</i>
Urban	Basic	CWS as generator of economic activity <i>Locate CWSs centrally to maximise the economic activity of users, who frequent more businesses and cultural activities when the CWS is centrally located.</i>
	Intermediate	CWS as a use for vacant/ historic/ protected structures <i>Increase funding from government and Local Authorities for assistance in maintaining/ refurbishing historic properties, along with guidance on maintenance issues and energy upgrades.</i>
	Advanced	CWS as hub for the Local Economy <i>Optimise the CWS as a hub for distributed events, by developing AV/ broadcast/ comms facilities. Incorporate fabrication labs and audio studios to promote the broadest possible range of enterprises using the space, allowing businesses to locate locally. Supply local food produce and services at on-site events.</i>
Environmental	Basic	CWS as low-energy workplace <i>Install LED lighting, temperature-controlled HVAC systems, automatic and movement sensitive lighting and electricity controls, and high spec insulation. Continue connected Hub funding for these upgrades. Power CWSs by on-site solar arrays where possible. Government should provide practical advice and funding where required. Encourage employers of remote workers to downsize the employer office to offset energy use.</i>
	Intermediate	CWS as reducer of commuting related GHG emissions <i>Locate CWS centrally to increase opportunities for active travel; provide facilities for active travel incl. bicycle stands and showers; locate along public transport corridors; install EV charging points for car commuters. Government should provide Demand Responsive Transit where required.</i>
	Advanced	CWS as hub of the Circular Economy <i>Use the CWS to assist the operation of local food hubs/ farmers markets/ trades networks, through online and in-person promotional and digital organisation. Connect the CWS to community renewable energy district heating systems, community recycling and composting initiatives, and community power generation.</i>

Table 7: Summary of findings. The table lists the research findings in the areas of social, urban, and environmental co-benefits of CWSs, classified by level of impact, from basic to intermediate to advanced. Each co-benefit is followed by a guidance note on management strategy or government policy required to encourage the occurrence of the co-benefit.

7. Conclusion

The study identifies the full range of co-benefits accruing from CWSs and reinforces the findings of the literature in relation to these impacts. Sound planning, proactive management strategies, and targeted public funding can all contribute to ensuring the maximum number of co-benefits are achieved. Social benefits include the CWS acting as a vibrant community resource. Urban benefits include economic activity, built fabric rehabilitation of underused buildings and urban areas, and the rejuvenation of troubled urban areas. Environmental benefits include the reduction of GHG emissions from operations and commuting. The research contributes to the discussion of the merits of CWS supportive policies and public funding, finding considerable justification for these measures.

7.1 Limitations and further research

The research includes a quantitative exercise in estimating the level of economic activity a centrally located CWS can generate in relation to that generated by a peripherally located CWS. This research could be expanded by the inclusion of corporate hospitality expenditure, as well as more precise geographic modelling of the subject CWSs. Further research could investigate the impact of CWSs in the regeneration of empty or derelict properties in their vicinity on a case study basis, using survey, photographic, and property registration data. Covid-19 travel restrictions have allowed employees and employers to discover the viability of remote working. The extent to which this trend will continue to contribute to the growth of the CWS sector post-Covid could be the subject of future research.

7.2 Concluding remarks

The study shows that CWSs have impacts far beyond their remit to provide convivial working environments. CWSs have demonstrated an ability to play an active part in ongoing efforts to rehabilitate small towns and villages. In generating social resilience, urban transformations, and environmental sustainability, CWSs are contributing to a significant moment of potential for the rebirth of local communities in a low-carbon age.

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Appendix A: Information leaflet

An information leaflet is included as Appendix A. This leaflet augments the research project by condensing the findings into a public awareness publication for a general readership.

Brief

Audience:

The leaflet is intended for a general audience consisting of interested members of the public and public representatives and officials interested in town rehabilitation and the potential of CWSs to assist in this regard. The leaflet forms a starting-off point for planning and discussions among groups and individuals considering operating a CWS. Community groups can learn about the range of co-benefits arising from the opening of a CWS, some of which may not be intuitive. Operators reading the leaflet will be encouraged to consider environmental and sustainable issues. Members of the public will be made aware of what CWSs are and how they can add to community spirit.

Publisher:

The leaflet is designed as a publication issued by a hypothetical organisation called “Ireland’s Town Partnership”. This is an imaginary government sponsored agency that mirrors Scotland’s Town Partnership, a not-for-profit independent company funded by the Scottish Government, which analyses policy prescriptions and develops ideas and innovations related to town issues in Scotland¹. The establishment of an Ireland’s Towns Partnership is a key suggested action of the Town Centre Living Initiative Synthesis Report². The report highlights the lack of a national body charged with supporting and representing towns. Ireland’s Town Partnership is envisaged as a hub for information and resources, capable of advising on funding, strategies, best-practice, and legal guidance. The body could take a proactive role in ensuring

¹ Scotlanttowns.org

² Crowe, P., Lyes, M., Murphy, O. 2020. The Town Centre Living Initiative: Synthesis Report. Dublin: UCD Centre for Irish Towns.

coordinated strategies of town development, with experience sharing across the country. The leaflet is a sample publication of this body.

Impact:

The leaflet aims to generate thought and conversation about the full range of co-benefits potentially arising from the establishment of a CWS. It aims to ensure that anyone planning a new CWS will be aware of the full range of social and environmental impacts that their project can address. The leaflet presents themes and ideas to interested parties, who can incorporate the ideas into their plans for their towns/ CWSs. Having read the leaflet, readers can compare their own plans with best practice principles.

Form:

The leaflet is in the form of a 4 page, A5 (148mm x 210mm) colour illustrated booklet. This format allows for a mixture of text and illustrations/ diagrams, which are at a larger scale than can be accommodated on a DL (99mm x 210mm) leaflet.

Inclusions/ format:

The leaflet contains a summary of the urban and community advantages of CWSs using images and text. To illustrate the range of co-benefits in a user-friendly way, two visual aides are employed- an illustration of a theoretical CWS in an urban setting, with numbered reference points relating to text explanations on the adjacent page. This illustration helps the reader visualise a best-case scenario in which the CWS assists in the creation of a liveable, sustainable, and vibrant town centre. The second aide is a sunburst pattern diagram of the full range of co-benefits. This allows readers who are interested in more detail to grasp in a structured way the co-benefits identified in the study in each of the social, urban, and environmental theme areas. Finally, a bullet point list of action items assists operators and communities in identifying the actions required to achieve these benefits from a new or existing CWS.

Presentation:

The leaflet is presented in thumbnail format showing all four pages on page 58, then each page is shown separately on pages 59-63.

MORE THAN WORK

Getting the most from your coworking space

IRISH TOWNS PARTNERSHIP Page 1

All over Ireland, more and more communities are home to coworking spaces, where producers, entrepreneurs, and remote workers can base themselves while enjoying the freedom to live anywhere they like. Many towns and villages are seeing the arrival of new workers and a wider range of employment opportunities for young people.

Coworking spaces can play an active part in community life, benefiting the local economy, social life, and environmental sustainability of their areas. So what are these benefits, and how can we best try to maximise them?

SOCIAL BENEFITS

- A** Generating footfall, street activity, and improving street safety.
- B** Offering community groups and social clubs low cost meeting spaces.
- C** Lunchtime learning events for workers and the public.

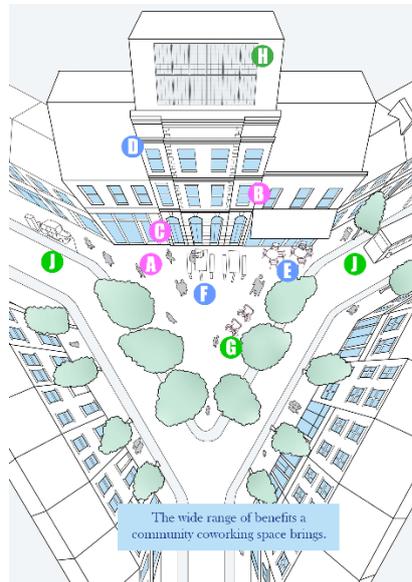
URBAN BENEFITS

- D** Resting historic, protected, or underused landmark buildings.
- E** Generating business for local cafes, shops, restaurants and the service economy.
- F** Generating interaction between users and the public.

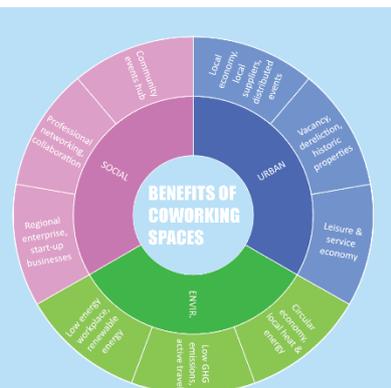
ENVIRONMENTAL BENEFITS

- G** Encouraging smart and active travel by providing or locating close to walking and cycling facilities.
- H** Using renewable energy like Solar PV to power the workspace.
- I** Reducing commute related carbon emissions by locating close to public transport and EV charging points.

Page 2



Page 3



These co-benefits can be achieved with the right planning and management strategies. Any **DEVELOPER** or **OPERATOR** of a coworking space should follow these guidelines:

- * Locate your coworking space near the centre of your town/ village, to optimise its role in the economy and community.
- * Promote your space as a hub for community events, meetings, and networking.
- * Invest in low-energy technologies and adopt a low-energy management plan.
- * Provide your users with secure bicycle parking and showering facilities.
- * Assign a staff member or a user as a "catalyst" to coordinate networking, community, social, and cultural events.

Page 4

MORE THAN WORK

Getting the most from your
coworking space

IRISH TOWNS PARTNERSHIP

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SOCIAL BENEFITS

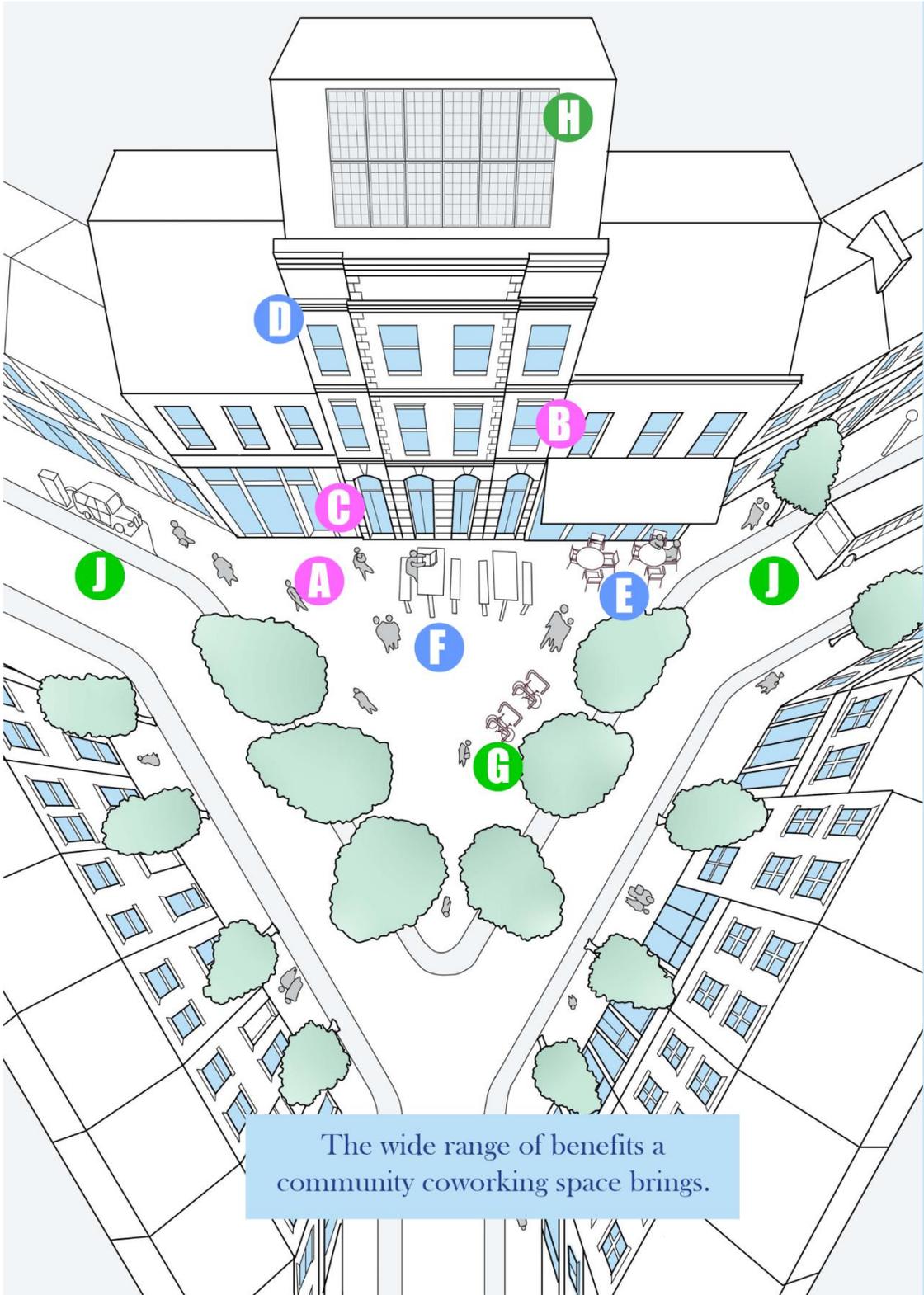
- A** Generating footfall, street activity, and improving street safety.
- B** Offering community groups and social clubs low cost meeting spaces.
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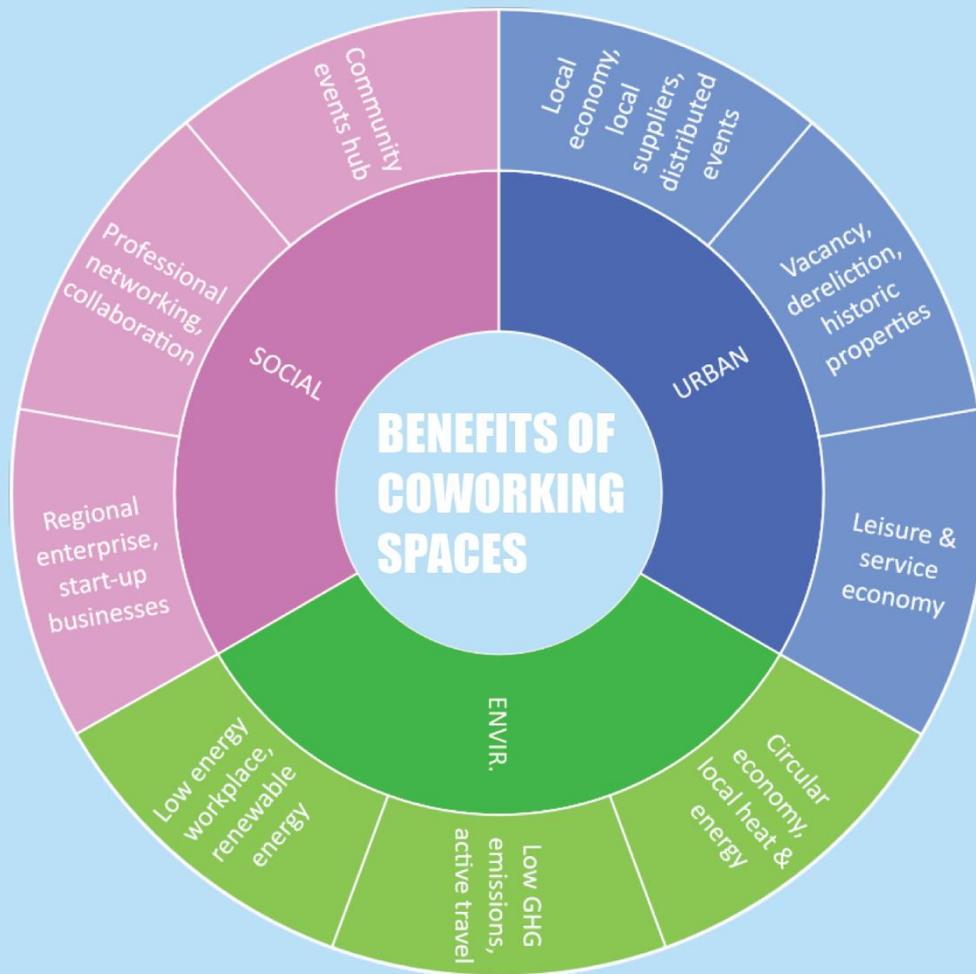
URBAN BENEFITS

- D** Resuing historic, protected, or underused landmark buildings.
- E** Generating business for local cafes, shops, restaurants and the service economy.
- F** Generating interaction between users and the public.

ENVIRONMENTAL BENEFITS

- G** Encouraging smart and active travel by providing or locating close to walking and cycling facilities.
- H** Using renewable energy like Solar PV to power the workspace.
- J** Reducing commute related carbon emissions by locating close to public transport and EV charging points.





These co-benefits can be achieved with the right planning and management strategies. Any **DEVELOPER** or **OPERATOR** of a coworking space should follow these guidelines:

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Appendix B: Interview template



Interview Questions:

1.0 Motivation and outcomes

1.1 Brief summary of motivation for establishing the coworking space, and outcomes from the operation of the CWS to date.

2.0 Nature and operation of coworking space

2.1 Describe the business model of the coworking space: what services/ facilities/ resources are available to users?

2.2 How was the location/ premises of the coworking space chosen?

2.3 How long has the space been in operation?

2.4 Funding- were any council/ state supports available to assist the establishment or operation of the space?

2.5 Briefly discuss the impact of Covid-19 on the operation of the space.

2.6 Does the coworking space offer vehicle/ bicycle parking; shower facilities; incentives for active travel?

2.7 Does the coworking have strategies for reducing energy use?

3.0 Interaction with community

3.1 Organised events- staff?

3.2 Organised events- public?

3.3 Interaction with community/ public bodies?

4.0 Co-workers

4.1 Are co-workers mostly from the locality? Have they relocated to the locality?

4.2 Any examples of collaborations developing between co-workers?

4.3 Is privacy of co-workers affecting users/ potential users in taking up coworking?

5.0 Any other points the interviewee would like to raise.

Appendix C: Survey Transcript

Section 1 of 8

The aim of this survey is to examine the social, economic, and environmental impacts of coworking spaces on towns and communities in Ireland.

All responses to this survey will be completely confidential and anonymous.

The survey is part of a research project being carried out by Stephen Wall, a student researcher in the School of Architecture, Planning and Environmental Policy, University College Dublin, under the supervision of Dr Philip Crowe.

All data collected will be used for research purposes and destroyed upon completion of the research. Conclusions about individual persons are not possible. Data will be treated in accordance with the provisions of the European Data Protection Regulations (GDPR EU).

Your participation in the survey is voluntary and can be terminated by you at any time and without giving reasons. Your participation in the research does not expose you to any significant risk.

If you have any questions, please email stephen.wall1@ucdconnect.ie

The survey will take around 5-10 minutes and your input is greatly appreciated.

1. Clicking on the "agree" button below indicates that you voluntarily agree to participate, and you are at least 18 years of age. If you do not wish to participate in the research study, please decline participation by clicking on the "disagree" button.

Agree

Disagree

Section 2 of 8

2. Are you currently, or have you ever been, a user of a coworking space (also referred to as a remote working hub) in the Republic of Ireland?

Yes

No

Section 3 of 8: The coworking space

3. Which of the following facilities are within a ten-minute walk of your coworking space? (Select all that apply)
- Public transport access (bus stop or train/ tram station)
 - Shared bicycle station
 - Grocery shop
 - Café
 - Licensed premises (pub/ bar)
 - Restaurant
 - Post Office
4. Is your coworking space located near the centre of your town/ village, or peripherally located (in an industrial estate, at the edge of town, or in a non-urban area)?
- Centrally located.
 - Peripheral
5. If you are currently a user of a coworking space, is your coworking space closed due to Covid-19 restrictions at present?

NA/ Yes/ No

6. If you are currently a user of a coworking space, is your coworking space operating at restricted capacity due to Covid-19 restrictions at present?

NA/ Yes/ No

7. Which of the following facilities are available in/ at your coworking space? (Select all that apply)
- Vehicle parking for coworking space users
 - Bicycle parking for coworking space users
 - Locker/ safe storage facilities
 - Showering facilities
 - Kitchen/ kitchenette (Select even if facility is closed due to Covid restrictions)
8. Which of the following activities are carried out in your coworking space (or were carried out to your knowledge before Covid-19 restrictions were applied)? Select all that apply.
- Arts/ cultural events accessible to the public
 - Lectures/ seminars/ educational events accessible to the public
 - Training courses accessible to the public
 - Yoga/ fitness events accessible to the public

- Weekend events for coworking space users
- Weekend events for the public

9. Which option best describes your work in the coworking space?

- I am self-employed.
- I am a freelancer.
- I am owner/ employee of a business located in the coworking space.
- I am an employee of a business at another location and use the coworking space to work remotely.
- Other

Section 4 of 8: Travel

10. How many days per week do you typically work in the coworking space?

1,2,3,4,5,6,7

11. How do you usually travel to the coworking space?

- On foot
- Bicycle
- Bus, minibus, or coach
- Train, DART or LUAS
- Motorcycle or scooter
- Driving a car
- Passenger in car
- Lorry or van
- Other

12. If you use public transport, how far away from your HOME is the nearest public transport access (bus/ train stop)?

- 100m or less
- 101-200m
- 201-300m
- 301-400m
- 401-500m
- 501-600m
- 601-700m
- 701-800m
- 801-900m
- 901-1000m
- 1km+

13. What distance is your journey to the coworking space (kilometres)?

Text Box

14. How long does your journey to the coworking space usually take (minutes)?

Text Box

15. Do any of the following statements apply to you? (Select all that apply)

- The availability of the coworking space allowed me to relocate to my current place of residence.
- Without the coworking space being available, I would feel pressure to leave my current place of residence for employment opportunities.
- I would like to relocate closer to the coworking space.
- The coworking space has not affected my place of residence.
- I would consider moving to another location provided a coworking space was available.

16. If the coworking space has affected your residential location in any way, please give details.

Text Box

Section 5 of 8: Preferences and attitudes

Please indicate how much you agree or disagree with the following statements (1 = strongly disagree, 5 = strongly agree)

17. When choosing a residential location, proximity to public transport is a key concern.

18. I am satisfied with the level of public transport available at my current residential location.

19. . If unsatisfied with the level of public transport available at your current location, briefly explain why.

Text box

20. I would like to use public transport to/ from the coworking space, but the availability/ quality of services prevents me from doing so.

21. I would like to engage in active travel (walking/ cycling) to/ from the coworking space, but I live too far from the coworking space to do so.

22. I would like to engage in active travel (walking/ cycling) to/ from the coworking space, but do not feel it is safe to do so.

23. If you have any comments on active travel to/from your coworking space, please briefly explain them here.

Text box

Section 6 of 8: Economic activity

24. How many times per week do you purchase lunch from a neighbouring business?

0,1,2,3,4,5+

25. Covid-19 restrictions have resulted in kitchens in coworking spaces being closed/ unavailable. If a fully functioning kitchen were available in your coworking space, how many times per week would you purchase lunch in a neighbouring business?

0,1,2,3,4,5+

26. When you purchase lunch from a neighbouring business, what is your average spend?

NA; €0-5; €5.01-10; €10.01-15; €15.01-€20; €20.01+

27. How many times per week do you purchase coffee/ snacks from neighbouring businesses on your way to/ from the coworking space, or during the day?

0,1,2,3,4,5+

28. What is your average spend on coffee/ snacks when you visit a neighbouring business on your way to/from the coworking space, or during the day?

NA; €0-3; €3.01-5; €5.01-7; €7.01-9; €9+

29. How often do you engage in the following activities after work, between leaving the coworking space and reaching home? (Never/ Once a week/ Several times per week/ once per month/ several times per month)

- Visit a café.
- Dine at a restaurant.
- Visit a licensed premises (bar/ pub)
- Go to the cinema.
- Attend a cultural/ arts event.
- Attend an educational event.

30. When engaging in the following activities after work, between leaving your coworking space and reaching home, what is your average expenditure? (NA; €0-10; €10.01-€20; €20.10-30; €30+)

Café

Restaurant

Licensed premises (bar/ pub)

Cinema

Attending a cultural event

Attending an educational event

Section 7 of 8: Demographics

31. What is your age?

- 18-30
- 31-40
- 41-50
- 51-60
- 61-70
- 70+

32. What is your gender?

- Female
- Male
- Other

33. What is your nationality?

- Irish
- Non-Irish EU citizen
- Non-EU citizen

Section 8 of 8: Thank you