Building a Good Digital Society from the Grassroots: Harnessing the Tradition of Community-led Initiatives in the Governance of Digital Services and Infrastructures

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Abstract

Over the past two decades, community broadband networks, platform cooperatives, and data cooperatives have emerged as promising models to counterbalance market distortions and power asymmetries in the governance of digital infrastructures, services and data. Drawing on multidisciplinary academic debates, this paper investigates how these grassroots approaches to the development and governance of digital innovations can be further harnessed to foster a good digital society. Both their accomplishments and shortcomings are thoroughly reviewed and critically analysed to illustrate and appraise their potential application into diverse spheres of the digital society (from the governance of high-speed networks to the protection of non-personal data). The paper concludes with a research and policy agenda, designed to address the challenges emerging from the analysis. Academic researchers are urged to further advance both the empirical and theoretical investigation of these initiatives to develop a more coherent and robust understanding of their development and sustainability over time. A systemic change in the approach of policymakers is also advocated for, to devise regulatory interventions and policy measures capable of sustaining the diffusion and scaleup of grassroots digital innovations.

***Keywords*:** community networks; platform cooperatives; data cooperatives; grassroots innovation; digital governance

Introduction

Since its inception, the digital society has benefitted from the proactive contributions of grassroots actors and initiatives. Community Wi-Fi and cooperative broadband networks have historically played a crucial role in serving remote locations otherwise excluded from the access to digital technologies.[1] More recently, digital platforms democratically run as cooperatives have been established across multiple industries to improve the working conditions of gig workers and enhance the transparency and fairness of digital services.[2] A similar approach is being increasingly adopted in the context of data governance, where collective data intermediaries, such as data cooperatives, are expected to enable a fairer reuse and sharing of personal and non-personal data.[3]

Researchers have long established that these grassroots approaches could lay the foundation for a better digital society, where the fundamental rights of individuals are safeguarded, marginalised communities are empowered, and the costs and benefits of digital innovation are equally distributed across and within different countries.[4,5] However, for these initiatives to make a broader and long-lasting impact, concerted efforts are required to address the ongoing challenges that undermine their sustainability and scalability.[6,7]

This paper exposes such challenges and propose a set of actions targeting both policymakers and researchers committed to sustain grassroots digital initiatives and to harness their potential for a fairer digital society. Drawing on the literature on sustainable transitions[8,9] and business model innovation.[10,11] the proposed research and policy agendas primarily aim to nurture multi-stakeholder collaborations between grassroots and incumbents actors, as key vehicles to promote systemic changes in the digital society.[12]

This paper is structured as follows. First, the state of the art on community-led initiatives in the digital society is presented through a review of ongoing multidisciplinary debates on community networks, platform cooperatives and data cooperatives. The evidence emerging in these sections then informs the policy and research agendas that conclude this piece.

1 P. Gerli and J. Whalley, 'Fibre to the countryside: a comparison of public and community initiatives tackling the rural digital divide in the UK', *Telecommunications Policy*, 45 (2020), 102222.

2 T. Scholz, 'Platform cooperativism. Challenging the corporate sharing economy' (New York, Rosa Luxemburg Foundation, 2016).

3 M. Micheli et al., 'Mapping the landscape of data intermediaries' (Brussels, Publications Office of the European Union, 2023).

4 L. Gwaka et al., 'Community networks as models to address connectivity gaps in underserved communities', *Information Development*, 39 (2023), 524-538.

5 M. Mannan & S. Pek, 'Platform cooperatives and the dilemmas of platform worker-member participation', *New Technology, Work and Employment*, (2023), 1-19.

6 D. Bunders et al., 'The feasibility of platform cooperatives in the gig economy', *Journal of Co-operative Organization and Management*, 10 (2022), 100167.

7 P. Micholia et al., 'Community networks and sustainability: a survey of perceptions, practices, and proposed solutions', *IEEE Communications Surveys & Tutorials*, 20 (2018), 3581-3606.

8 G. Feola and R. Nunes, 'Success and failure of grassroots innovations for addressing climate change: The case of the Transition Movement', *Global Environmental Change*, 24 (2014), 232-250.

9 G. Seyfang and N. Longhurst, 'What influences the diffusion of grassroots innovations for sustainability? Investigating community currency niches', *Technology Analysis & Strategic Management*, 28 (2016), 1-23.

10 F. Ciulli et al., 'Sustainable business model innovation and scaling through collaboration', *Environmental Innovation and Societal Transitions*, 45 (2022), 289-301.

11 W. Wirtz et al., 'Business model innovation in the public sector: an integrative framework', *Public Management Review*, 25 (2023), 340-375.

12 P. Gerli et al., 'Friends or enemies? Unraveling niche-regime interactions in grassroots digital innovations', *Technological Forecasting and Social Change* (2024), 123342.

Community networks

Community networks consist of broadband infrastructures built, managed and co-operatively owned by groups of users, most frequently belonging to the same geographic community.[13] For the past twenty years, they have offered a valid alternative to the connectivity provision of commercial broadband suppliers.[14,15] For marginalised communities, such as indigenous groups and deprived neighbourhoods, they have often represented the only form of Internet access.[16]

Originally these community-led initiatives focused on the deployment of wireless networks as a remedy to the digital divide existing between rural and urban areas[17,18] or as a form of resistance to the power of commercial corporations and government-owned operators dominating the provision of telecommunications services.[19] Nowadays, wireless community networks still play a crucial role in expanding the supply of connectivity within low-income countries.[20,21] In Europe, instead, community efforts have shifted towards the deployment of optic fibre networks, which are capable of delivering faster and more reliable Internet connections but also entail much higher deployment costs.[22]

A most prominent example of community network is Broadband for the Rural North (B4RN), established in Lancashire (UK) in 2011 by a group of local volunteers led by a former telecommunications engineer. In the early 2000s, some of the founding volunteers had been involved in the launch of a WiFi community network, in cooperation with researchers from Lancaster University.[23] Almost ten years later, as they found themselves excluded from the UK government programme to subsidise broadband rollout in rural areas, the same local communities decided to start-up a community-owned fibre network.[24]

Since then, over the past decade, B4RN has expanded its network across Northern England, providing rural communities with Internet connections faster than those available in most UK cities.[25] To achieve this, they have adopted an innovative operational model partially inspired by the experience of Guifi.net, another community network located in Spain.[26] In both cases, the broadband infrastructures are cooperatively owned and built with the financial and material support of local communities, whose collective intelligence was leveraged to address the market failures typically constraining the supply of fast connectivity in rural areas.[27] Engaging local actors in the development of these networks does not only minimise the costs and risks of infrastructure deployment: it also contributes to stimulating the demand for broadband by raising awareness on its benefits and encouraging more people to engage with digital services.[28,29]

B4RN and Guifi.net certainly represent successful cases of long-standing community-led initiatives in broadband markets. Yet it is well documented that most community networks struggle to become sustainable and to remain operational over the long term.[30] Because of the high fixed costs of broadband rollout, the small scale of community networks is one of the factors undermining their economic sustainability.[31] Grassroots organisations are also known to be more vulnerable to supply chain shocks, undermining their resilience.[32] Finally, these initiatives are more likely to serve remote and marginalised communities with limited financial resources, and their reliance on local volunteers brings additional strains to their long-term operations.[33]

Public support for these networks could be easily justified, given that these initiatives most frequently target areas where market-based offers are not operating or not affordable.[34] However, the relationships between community networks and public authorities at different administrative levels have not always been the most fruitful. These grassroots actors are often in open contrast with nationwide or regional programmes supporting broadband deployments[35] as they are committed to pursue technological sovereignty by empowering local communities to control their own broadband infrastructures.[36]

13 Micholia, 'Community networks and sustainability'.
14 J. M. Carroll and M. B. Rosson, 'Theorizing mobility in community networks', *International Journal of Human-Computer Studies*, 66 (2008), 944-962.
15 F. Tréguer et al., 'Learning from the history of alternative communication networks', *Journal of Alternative & Community Media*, 5 (2020), 9-26.
16 C. Rey-Moreno, 'Supporting the Creation and Scalability of Affordable Access Solutions: Understanding Community Networks in Africa' (Geneva, The Internet Society, 2017).
17 R. Huggins and H. Izushi 'The digital divide and ICT learning in rural communities: examples of good practice service delivery', *Local Economy*, 17 (2002), 111-122.
18 J. Ishmael et al., 'Deploying rural community wireless mesh networks', *IEEE Internet Computing*, 12 (2008), 22-29.
19 P. De Filippi and F. Tréguer, 'Expanding the Internet Commons: The Subversive Potential of Wireless Community Networks', *Journal of Peer Production*, 6 (2015).
20 Gwaka, 'Community networks as models to address connectivity gaps in underserved communities'.
21 Rey-Moreno, 'Supporting the Creation and Scalability of Affordable Access Solutions'.
22 P. Gerli et al., 'Infrastructure investment on the margins of the market: The role of niche infrastructure providers in the UK', *Telecommunications Policy*, 41 (2017), 743-756.
23 Ishmael et al., 'Deploying rural community wireless mesh networks'.
24 Gerli, 'Infrastructure investment on the margins of the market: The role of niche infrastructure providers in the UK'.
25 A. Smith et al., 'Broadband speed map reveals Britain's new digital divide', *Financial Times* (2018).
26 P. Gerli, 'Can broadband markets be fixed? A comparative analysis of public and community-led initiatives supporting broadband diffusion in three EU member states' (Newcastle upon Tyne, Northumbria University, 2020).
27 Gerli, 'Fibre to the countryside'.
28 Gwaka, 'Community networks as models to address connectivity gaps in underserved communities'.
29 Gerli, 'Infrastructure investment on the margins of the market: The role of niche infrastructure providers in the UK'.
30 Micholia, 'Community networks and sustainability'.
31 C. Fuchs, 'Sustainability and community networks', *Telematics and Informatics*, 34 (2017), 628-639.
32 Gerli, 'Can broadband markets be fixed?'.
33 K. Salemink and D. Strijker, 'The participation society and its inability to correct the failure of market players to deliver adequate service levels in rural areas', *Telecommunications Policy*, 42 (2018), 757-765.
34 Gerli, 'Fibre to the countryside'.
35 Gerli, 'Infrastructure investment on the margins of the market: The role of niche infrastructure providers in the UK'.
36 De Filippi and Tréguer, 'Expanding the Internet Commons'.

Governments have equally shown a certain reluctance to endorse community networks.[37] Due to the emphasis of procurement regulations on the minimisation of public spending, state aid interventions in broadband markets have inevitably favoured large-scale commercial providers that promise to offer more advantageous economic conditions and lower levels of risk.[38] Several programmes to support the piloting of innovative approaches to broadband provision have been launched over the years[39], but they have rarely been followed-up by larger-scale deployments.[40] This does not come as a surprise, given the tendency of public authorities to overemphasise the testing of technological solutions with little consideration for their sustainable replication and scale-up.[41]

Echoing the literature on grassroots innovation and socio-technical transitions ecosystem[42,43], it is fair to claim that community networks remain localised niche innovations that struggle to drive systemic change in the mainstream broadband ecosystem. Nonetheless, it is undeniable that the experience of these initiatives could also prove beneficial to larger commercial providers.

Something to be further explored is the potential role of cooperative approaches to the development of new digital infrastructures, such as 5G networks or sensors networks. The experience of community-led broadband initiatives could offer valuable insights for the diffusion of 5G in areas currently unserved by commercial deployments.[44] Likewise, demand-led, cooperative approaches to the rollout and governance of digital infrastructures could help boost their acceptance among local communities[45] and encourage the bottom-up development of place-based, people-centric digital services.[46]

Platform cooperatives

Platform cooperatives are digital platforms run as and by cooperatives of workers or other forms of cooperative organisations.[47,48] They have emerged over the past decade as an alternative to the so-called capitalist platforms, that is, the digital platforms controlled by big tech corporations.[49,50]

Given their market power in the global digital economy, big tech companies can utilise algorithms, data and other digital artefacts to maximise their profits with little consideration for the welfare of the consumers and workers relying on their platforms.[51] Ride-hailing apps well exemplify this tendency: they are known to use algorithmic management techniques to both increase taxi fares during peak hours and to control the performance of drivers.[52]

Conversely, platform cooperatives are committed to achieve a transparent and fair governance of the algorithms and socio-technical arrangements underpinning digital platforms.[53] This is pursued through participatory, bottom-up decision-making processes that enable the cooperative members to have a say on how their platform should be managed.[54] For this reason, these initiatives are seen by many as a promising approach to adjust market distortions in the so-called shared economy and to empower workers in the gig economy.[55,56]

Examples of platform cooperatives can be found globally across different sectoral domains, from tourism to sustainable mobility, from social care to creative industries.[57,58] Significant exemplars include food-delivery and ride-hailing apps democratically governed by riders and taxi drivers, enabling these categories of workers to leverage the opportunities offered by digital technologies while safeguarding and enhancing their working conditions.[59,60] In the United Kingdom, several grassroots e-commerce portals and smartphone apps were also launched during the Covid-19 pandemic to mitigate the effects of lockdowns on local shops and restaurants.[61] Another area of the UK economy where

37 Salemink, 'The participation society and its inability to correct the failure of market players'.
38 P. Gerli et al., 'Infrastructure provision on the margins: An assessment of broadband delivery UK', *International Journal of Public Administration*, 43 (2020), 540-551.
39 Department of Culture Media and Sport, 'Emerging Findings from the BDUK Market Test Pilots' (London, 2016).
40 Gerli, 'Infrastructure provision on the margins: An assessment of broadband delivery UK'.
41 L. Mora et al., 'Smart city governance from an innovation management perspective: Theoretical framing, review of current practices, and future research agenda', *Technovation*, 123 (2023), 102717.
42 Seyfang, 'What influences the diffusion of grassroots innovations for sustainability?'.
43 F. W. Geels, 'Socio-technical transitions to sustainability: a review of criticisms and elaborations of the Multi-Level Perspective', *Current Opinion in Environmental Sustainability*, 39 (2019), 187-201.
44 I. Williams, 'Community Based Networks and 5G Wi-Fi', *Ekonomiczne Problemy Usług*, 131 (2018), 321-334.
45 P. Gerli, 'Municipal 5G bans during the Covid-19 pandemic: the case of Italy', *Digital Policy, Regulation and Governance*, 23 (2021), 553-573.
46 Mora, 'Smart city governance from an innovation management perspective'.
47 D. J. Bunders and T. De Moor, 'Paradoxical tensions as a double-edged sword: Analysing the development of platform cooperatives in the European gig economy', *Journal of Management Inquiry*, 2023.
48 E. Papadimitropoulos, 'Platform capitalism, platform cooperativism, and the commons', *Rethinking Marxism*, 33 (2021), 246-262.
49 Scholz, 'Platform cooperativism'.
50 Papadimitropoulos, 'Platform capitalism, platform cooperativism, and the commons'.
51 Mannan, 'Platform cooperatives and the dilemmas of platform worker-member participation'.
52 E. McDaid et al., 'Algorithmic management and the politics of demand: Control and resistance at Uber', *Accounting, Organizations and Society*, 109 (2023), 101465.
53 R. Grohmann, 'Rider Platforms?: Building Worker-Owned Experiences in Spain, France, and Brazil', *South Atlantic Quarterly*, 120 (2021), 839-852.
54 Papadimitropoulos, 'Platform capitalism, platform cooperativism, and the commons'.
55 International Labour Organisation, 'Platform labour in search of value: A study of worker organizing practices and business models in the digital economy' (Geneva, 2021).
56 Scholz, 'Platform cooperativism'.
57 S. Borkin, 'Platform co-operatives–solving the capital conundrum' (London, NESTA, 2019).
58 Bunders, 'Paradoxical tensions as a double-edged sword'.
59 Grohmann, 'Rider Platforms?: Building Worker-Owned Experiences in Spain, France, and Brazil'.
60 T. Vieira, 'The lose-lose dilemmas of Barcelona's platform delivery workers in the age of COVID-19', *Social Sciences & Humanities Open*, 2 (2020), 100059.
61 Gerli, 'Friends or enemies'.

platform cooperatives have gained a prominent position is the health and social care sector, wherein there operate EqualCare.Coop, a multistakeholder cooperative running an online marketplace for carers, and Signalise, a platform cooperative providing interpreting services for deaf people.[62,63]

Despite their promising potential and growing popularity, overall platform cooperatives remain marginal actors in the digital economy as they struggle to stay competitive and erode the market position of corporate platforms.[64] Whereas big tech corporations can drastically reduce their operational costs by exploiting economies of scale and diversification, grassroots platforms often struggle to upscale due to a lack of financial and political support from mainstream institutions.[65]

Some of these challenges may be addressed by embracing federative models that allow platform cooperatives to preserve their local distinctiveness while achieving economies of scale in technology development.[66] This approach has been successfully pursued, for instance, by The Mobility Factory, a European-wide consortium formed by local cooperatives to mutualise their digital infrastructure and create a common car-sharing platform adaptable to and adoptable by different communities.[67] The diffusion of low-code and zero-code technologies is also expected to further reduce the development costs of digital platforms thereby facilitating grassroots efforts in this domain.[68]

Besides these technological advancements, though, a shift in policymaking is also crucial to sustain the replication of platform cooperatives across diverse sectoral and geographic contexts. International institutions, such as the ILO[69], are increasingly recognising the pivotal role that these grassroots initiatives can play in bettering working conditions for gig workers. Likewise, a growing number of local and national governments have lately been supporting platform cooperatives by acquiring their services, offering grants, and promoting their coordination across different locations.[70] For example, a national network of cooperative car-sharing platforms has been created in Spain with the financial support of the national government.[71] In the UK, the abovementioned Signalise has been awarded a public contract to provide interpretation services for a regional division of the National Health Service.[72]

These interventions, however, remain sporadic and are quite susceptible to changes in the vision and commitment of political leaders and public authorities, an issue often observed in the context of digital transformation processes.[73] Without holistic, pervasive and durable changes in the institutional and cultural frameworks shaping the governance of digital transitions, platform cooperatives also run the risk of remaining niche initiatives with little impact on the mainstream digital economy.[74,75]

Yet their practices and innovative solutions could prove beneficial to address some of the challenges encountered by other organisations with regard to the governance of digital platforms and digital services.[76,77] For instance, cooperative and federative approaches could be applied to develop sustainable business models for e-government and e-healthcare services.[78,79] Likewise, the experience of platform cooperatives could instigate and inspire the digital transformation of incumbent cooperatives and other third-sector organisations, which have struggled so far to embrace digital innovation and embed it in their value propositions.[80,81]

Data cooperatives

Unlike platform cooperatives and community networks, which have been part of the digital economy and society for more than a decade, data cooperatives have appeared only recently, and their application remain limited to few sectoral domains.[82,83] Nonetheless, their potential contribution to a fairer and more inclusive digital society has been recently recognised and emphasised by policymakers at different levels, including the UK Government, which has listed data cooperatives among the intermediary organisations expected to facilitate and incentivise data sharing and unlock opportunities in the data economy.[84]

62 Borkin, 'Platform co-operatives–solving the capital conundrum'.
63 Cooperative UK, 'Co-operatives UK launches UnFound Accelerator – for ethical digital business start-ups' (London, 2022).
64 Bunders, 'The feasibility of platform cooperatives in the gig economy'.
65 Gerli, 'Friends or enemies'.
66 V. Papadimitropoulos and H. Malamidis, 'Prefiguring the counter-hegemony of open cooperativism: The case of Open Food Network', *Journal of Rural Studies*, 101 (2023), 103067.
67 C. G. Castellví and L. Reichel, 'The Mobility Factory: A European cooperative providing e-car sharing services to citizens' (Barcelona, Barcelona Centre for International Affairs, 2021).
68 A. Bock and U. Frank, 'Low-Code Platform', *Business & Information Systems Engineering*, 63 (2021), 733–740.
69 International Labour Organisation, 'Platform labour in search of value'.
70 Gerli, 'Friends or enemies'.
71 ConectaMovel, 'Red Movilidad. Un proyecto singular y plural' (2022).
72 N. Evans, 'Signalise Co-op announced as NHS Liverpool CCG main provider' (Medium, 2021).
73 Mora, 'Smart city governance from an innovation management perspective'.
74 Seyfang, 'What influences the diffusion of grassroots innovations for sustainability?'.
75 Geels, 'Socio-technical transitions to sustainability'.
76 L. P. Dana et al., 'Urban entrepreneurship and sustainable businesses in smart cities: Exploring the role of digital technologies', *Sustainable Technology and Entrepreneurship*, 1 (2022), 100016.
77 K. Jun Lee and J. H. Hong, 'Development of an e-government service model: a business model approach', *International Review of Public Administration*, 7 (2002), 109-118.
78 P. Gerli et al., 'Beyond contact-tracing: The public value of eHealth application in a pandemic', *Government Information Quarterly*, 38 (2021), 101581.
79 Wirtz et al., 'Business model innovation in the public sector'.
80 B. Ribeiro-Navarrete et al., 'Setting the development of digitalization: state-of-the-art and potential for future research in cooperatives', *Review of Managerial Science* (2023).
81 F. J. Santos et al., 'Assessing the digital transformation in agri-food cooperatives and its determinants', *Journal of Rural Studies*, 105 (2024), 103168.
82 I. Naeem et al., 'Community-based Health Data Cooperatives Towards Improving the Immigrant Community Health: A Scoping Review to Inform Policy and Practice', *International Journal of Population Data Science*, 5 (2020), 1-29.
83 A. Salau et al., 'Data Cooperatives for Neighborhood Watch', 3rd IEEE International Conference on Blockchain and Cryptocurrency (2021).
84 UK Government, 'Unlocking the value of data: Exploring the role of data intermediaries' (London, 2021).

These cooperative organisations pool the data of multiple subjects and negotiate on their behalf the conditions at which third parties can access and use their data.[85] This allows individuals to capture some of the value that others can obtain from their data, mitigating current power imbalances in the data economy and providing additional incentives to data sharing.[86] The collective approach of these intermediaries also contributes to boosting the security and quality of large datasets, by enabling the achievement of scale economies in data storage and protection.[87]

Noteworthy examples of data cooperatives come from the healthcare sector[88], where organisations such as Salus.coop (Spain) and MIDATA (Switzerland) are facilitating the collaboration between individuals and medical institutions interested in using their health data for research purposes. Other promising applications of this model have been experimented within the agriculture sector, where initiatives like the Grower's Information Services Coop in the US and Farmerline in Ghana are committed to facilitate data sharing and data access among farmers and their partners.

Despite these successful cases, the sustainability and scalability of data cooperatives remain an open question for policymakers and scholars.[89] It is unclear, at this stage, how these data intermediaries can become financially viable as their business model require further testing and large-scale experimentations.[90] The lack of well-established technical standards and procedures for the sharing of interoperable data could also pose additional threats to the operational success of these organisations.[91]

Another question worth asking is whether the cooperative governance of data requires the establishment of new entities, or existing cooperatives can also take the function of data intermediaries. This is a matter of particular relevance in those sectoral contexts, such as agriculture and local mobility, where cooperative organisations are already established economic actors.[92] Investing incumbent organisations of data intermediation functions could make sense from a business perspective, as it would minimise the need to set up new entities and duplicate existing governance structures. Furthermore, the positive reputation of established cooperatives and the trust relationships existing among their members could be leveraged to incentivise data pooling and streamline participatory modes of data governance.[93]

On the other hand, to act as data intermediaries, traditional cooperatives would need to significantly extend their skillset and diversify their workforce, embarking on a transformational process that may prove even more difficult for organisations that are also renowned for their reluctance to embrace technological and business model innovation.[94,95] Further research is, therefore, needed to understand how emerging and existing cooperatives can cooperate to sustain and promote collective modes of data governance. In those industrial and cultural contexts where cooperatives have historically played a marginal role, it is also crucial to explore how the principles of cooperativism can be successfully introduced and applied to the governance of data.[96]

It must be noted that, alongside data cooperatives, other types of data intermediaries promoting collective modes for data governance have emerged, such as data unions and data trusts. The former refer to organisations that, on behalf of their members, collectively bargain the conditions at which their data can be made accessible to third parties.[97] Data trusts, instead, encompass those legal mechanisms through which an individual can entrust a trustee to govern their data on their behalf.[98]

The differences between these models are sometimes minimal[99] and endorsing a model over another would be possibly detrimental at this stage, given that data intermediation practices are still in their infancy. What is much needed, instead, is material support for the experimentation of alternative cooperative models for data governance. Research and incubation programmes could serve this purpose, allowing for the piloting of collective data intermediaries in alternative industrial and geographic settings.[100]

Scaffolding legal frameworks and technical infrastructures for the collective governance of data is equally important, as the operational success of these data intermediaries is likely to ultimately depend on the availability of clear rules, shared procedures and harmonised standards for data sharing.[101,102] Further emphasis should also be placed on the governance of non-personal data, a matter largely overlooked in academic and policy debates despite the significant legal and ethical challenges associated with the sharing of non-personal data.[103] Such challenges are destined to escalate even further following the large-scale diffusion of artificial

85 M. Bühler et al., 'Data cooperatives as catalysts for collaboration, data sharing, and the (trans) formation of the digital commons', *Buildings*, 13 (2023), 442-464.
86 T. Fia, 'An alternative to data ownership: Managing access to non-personal data through the commons', *Global Jurist*, 21 (2020), 181-210.
87 I. Van Roessel et al., 'Potentials and Challenges of the Health Data Cooperative Model', *Public Health Genomics*, 20 (2017), 321-331.
88 Naeem, 'Community-based Health Data Cooperatives Towards Improving the Immigrant Community Health'.
89 Mehta, S. et al., 'Can data cooperatives sustain themselves?', (London, LSE Business Review, 2021).
90 Micheli, 'Mapping the landscape of data intermediaries'.
91 Mora, 'Smart city governance from an innovation management perspective'.
92 G. Diebold, 'Exploring Data-Sharing Models to Maximize Benefits From Data' (Washington DC, Centre for Data Innovation, 2023).
93 A. Kapoor and B. Vaitla, 'Data co-ops: How cooperative structures can support women's empowerment' (Washington DC, Brookings, 2022).
94 Ribeiro-Navarrete, 'Setting the development of digitalization'.
95 Santos, 'Assessing the digital transformation in agri-food cooperatives and its determinants'.
96 Gerli, 'Friends or enemies'.
97 N., Zingales, 'Data Collaboratives, Competition Law and the Governance of EU Data Spaces', (Research Handbook on the Law and Economics of Competition Enforcement, Edward Elgar, 2022), 8–49.
98 B. Carballa Smichowski, 'Alternative data governance models: Moving beyond one-size-fits-all solutions', *Intereconomics*, 54 (2019), 222-227
99 Micheli, 'Mapping the landscape of data intermediaries'.
100 B. Carballa Smichowski, 'Alternative data governance models'.
101 Gerli, 'Friends or enemies'.
102 Mora, 'Smart city governance from an innovation management perspective'
103 Fia, 'An alternative to data ownership'..

intelligence systems: hence, additional policy interventions may be required to address existing power imbalances in the governance of non-personal data, drawing on and expanding existing legal frameworks for data protection and intellectual property rights.[104,105]

Towards a good digital society: a research agenda to assess and boost the impact of cooperative governance approaches

As articulated in the previous sections, our knowledge of community networks, and platforms cooperatives and data cooperatives hinges upon rich multidisciplinary academic debates. Yet extant research has mostly focused on the rationales underlying these initiatives and their potential contributions to a fairer and more equitable digital society, often relying on a limited sample of successful cases from a few sectoral domains and geographic contexts.[106,107] These cases, some of which are also cited in this paper, represent a valid and promising reference point, but their applicability and replicability across different industries and locations is debatable, given the salience of contextual factors for the development of grassroots initiatives.[108]

Further empirical investigations are, therefore, needed to expand our knowledge base on grassroots innovations in the digital society, to systematically map their trajectories over time and to fully assess their effective outcomes. Specifically, scholars should pay additional attention to the medium- and long-term development of these initiatives rather than focusing on their start-up phases[109], prioritising longitudinal and comparative analyses.[110] Drawing on the literature on grassroots innovations for sustainable transitions[111,112] the focus of future empirical research should be on both the dynamics internal to cooperative organisations and their interactions with incumbent actors in the digital society.

Mapping the processes and business models successfully applied by community-led initiatives could also provide useful lessons transferrable to other sectors. An in-depth understanding of these grassroots practices could particularly benefit public organisations in their quest to develop innovative business models compatible with public values.[113,114] The experience accumulated by community-led initiatives could also help bridge current gaps in the theorisation and application of sustainable and scalable business models for smart cities[115], e-government services[116], digital twins[117] and open data platforms.[118]

To achieve this, however, further research is needed to understand how the innovative approaches developed by grassroots actors can effectively be integrated and adopted by incumbent organisations dominating the digital society.[119,120] The literature on grassroots innovation in socio-technical transitions offer preliminary insights[121], but further empirical inquiries and theoretical reasonings are required to understand how the idiosyncrasies of digital ecosystems affect the interplay between grassroots and incumbent actors.[122] There is a widespread assumption that the start-up costs of digital platforms and broadband networks make community-led initiatives unsustainable unless they manage to reach a broader scale.[123] Techno-economic analyses should, therefore, shed further light into this[124] by utilising data coming from grassroots organisations to test the viability of their models and their replicability in alternative contexts. Forecasting methods could also help assess how upcoming technological developments can impact the start-up and long-term evolution of community-led initiatives.[125]

From a theoretical perspective, it would be worth reflecting on the alternative narratives that may help inspire and shape new grassroots practices in the digital economy.[126] The extant literature tends to emphasise the radical nature of community networks, platform and data cooperatives, consistent with the ideological motives often underpinning these initiatives.[127,128]

104 C. Atik, 'Towards comprehensive European agricultural data governance: Moving beyond the "data ownership" debate', *IIC-International Review of Intellectual Property and Competition Law*, 53 (2022), 701-742.
105 G. Noto La Diega, 'Internet of Things and the Law: Legal Strategies for Consumer-centric Smart Technologies' (London, Taylor & Francis, 2023).
106 E. Apostolopoulou et al., 'Radical social innovations and the spatialities of grassroots activism: navigating pathways for tackling inequality and reinventing the commons', *Journal of Political Ecology*, 29 (2022), 143-188.
107 Papadimitropoulos, 'Platform capitalism, platform cooperativism, and the commons'.
108 Gerli, 'Friends or enemies'.
109 B. K. Sovacool, 'Guides or gatekeepers? Incumbent-oriented transition intermediaries in a low-carbon era', *Energy Research & Social Science*, 66 (2020), 101490.
110 Mannan, 'Platform cooperatives and the dilemmas of platform worker-member participation'.
111 Feola, 'Success and failure of grassroots innovations for addressing climate change'.
112 Seyfang, 'What influences the diffusion of grassroots innovations for sustainability?'.
113 Gerli, 'Beyond contact-tracing'.
114 Wirtz et al., 'Business model innovation in the public sector'.
115 K. Timeus et al., 'Creating business models for smart cities: A practical framework', *Public Management Review*, 22 (2020), 726-745.
116 Jun Lee and Hong, 'Development of an e-government service model'.
117 S. S. Kamble, 'Digital twin for sustainable manufacturing supply chains: Current trends, future perspectives, and an implementation framework', *Technological Forecasting and Social Change*, 176 (2022), 121448.
118 C.C. Yu, 'A value-centric business model framework for managing open data applications', *Journal of Organizational Computing and Electronic Commerce*, 26 (2016), 80-115.
119 Ciulli, 'Sustainable business model innovation and scaling through collaboration'.
120 Geels, 'Socio-technical transitions to sustainability'.
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Nonetheless, an overemphasis on their radicality could, at least to some extent, result misleading and counterproductive as it diverts the attention of scholars and practitioners from the pragmatic values and utilitarian benefits that also motivate and sustain cooperative governance models.[129,130] Rebalancing the narrative on grassroots initiatives in academic debates would certainly help advance their practice and theorisation, in addition to boosting their acceptance and recognition among the general public.[131]

Towards a good digital society: a policy agenda to fully harness the potential of cooperative approaches for the governance of digital infrastructures, platforms and data

As noted above, community-led initiatives in the digital economy often have conflictual relationships with policymakers, although many of them have also obtained both political and financial support from public authorities at different administrative levels.[132] Whereas additional financial resources and political recognition would undoubtedly benefit the development of these grassroots models, this would not necessarily guarantee their long-term viability. Previous research has rather found that an excessive reliance on public funding may force community-led initiatives to alter their operational models and revise their objectives.[133] This could ultimately undermine their grassroots identity and discourage the active participation of members and volunteers, which remain the most important assets of cooperative organisations.[134]

What is urgently required are more radical and systemic changes in how policymakers sustain innovative and grassroots practices in the digital economy.[135] A shift is needed in the policymaking of innovation funding, which currently overemphasises the launch and experimentation of new solutions over the continuation of promising initiatives with a successful track record.[136,137] Too often pilot projects are not followed up by further developments[138], hence there is a need to commit additional resources to the scale-up and replicability of successful practices, as well as to the dissemination of their results and transferrable know-hows.[139]

The rhetoric of neutrality dominating the policymaking of the digital economy is another major issue that needs to be reconsidered.[140,141] As digital markets naturally tend towards oligopolistic structures, additional ad-hoc measures may be required to strengthen the competitive positions of new entrants.[142,143] Accordingly, procurement regulations should be revised to ensure that small-scale and grassroots organisations can also effectively compete in public tenders.[144] Likewise, industrial policies shaping and driving the development of digital transitions should introduce specific safeguards to facilitate the long-term development and sustainability of those initiatives offering an alternative model for the delivery of digital infrastructures and services.[145] Such safeguards could include, for example, ad-hoc measures for the allocation of spectrum dedicated to community networks, or incubation programmes to sustain the scale-up of emerging platforms and data intermediaries.[146,147] At the municipal and regional level, public authorities could also play a pivotal role in supporting the upscaling of grassroots initiatives by facilitating the coordination and integration of existing local initiatives.[148]

Finally, the role of schools, colleges and universities is fundamental to raise awareness and disseminate knowledge on existing and emerging alternative models for the governance of digital transformations.[149] Over the past forty years, the public debate on the economy has been mostly pervaded and dominated by neoliberal discourses, which are also profoundly embedded in the digital economy and its start-up culture.[150] Although cooperative governance approaches have lately gained greater resonance, they remain obscure and unfamiliar to most people outside academic and political circles. Diversifying academic curricula and opening public debates to new voices, offering alternative visions on the digital society[151], is therefore crucial to support the launch of community-led initiatives, sustain their long-term development and fully tap into their transformative potential for a better digital society.

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