Fractured Data Infrastructures

Sociomaterial frictions in the digitalization of Irish planning

Juliette Davret, Danielle Hynes, and Rob Kitchin

Introduction

The digitalization of urban and spatial planning represents one of the most significant transformations in contemporary governance practices. Planning authorities, across jurisdictions, have increasingly embraced digital technologies as solutions to long-standing challenges of coordination, transparency, and efficiency (Daniel and Pettit 2021). Digital tools, such as Geographic Information Systems (GIS) which are used to conduct spatial analysis, planning application management systems, simulation models, and online consultation platforms designed to enhance public participation, have become central to how planning is conceived, practiced, and legitimized (Batty 2013; Townsend 2013). Alongside these well-established tools, emerging technologies such as city information models, virtual- and augmented-reality, and GenAI powered planning support tools continue to evolve and alter how planning is undertaken (Portman et al. 2021; Geertman and Stillwell 2020; Lartey and Law 2025). Yet, this digital turn in planning is frequently characterized by a persistent gap between technological promises and material realities. While policy makers and technology providers promote visions of seamless integration, real-time data flows, and automated decision-making, the everyday implementation of digital systems reveals a more complex landscape of partial adoption, workarounds, and ongoing struggles with legacy systems (Coletta et al. 2019; Kitchin et al. 2025b). This disconnect, between imaginaries and practical realities, suggests the need for more nuanced, materially grounded analyses of how digitalization actually unfolds within planning organizations.

The significance of examining planning digitalization's cultural and material dimensions extends beyond mere technological critique. As planning increasingly relies on digital infrastructures to collect, process, and distribute information, the ways these systems function (or fail to function) directly shape the possibilities for democratic participation, evidence-based decision-making, and effective governance (Shelton et al. 2015). Understanding digitalization as a sociomaterial process,

rather than simply a technological upgrade, reveals how existing and emerging power relations, institutional cultures, and material constraints all become embedded within (seemingly neutral) digital tools (Poschmann 2024; Flanagan et al. 2008; Winner 1980).

This chapter examines digitalization's cultural and material dimensions in Irish planning by exploring how digital infrastructures function as complex sociomaterial assemblages, rather than impartial technological tools. The analysis reveals how fragmented digital systems nevertheless enable planning work to continue through ongoing processes of negotiation, adaptation, and repair, drawing on the notion of 'good enough' functionality (Collins 1994; Gabrys et al. 2016; Bialski 2024). The chapter challenges the dominant narratives of seamless digital transformation by demonstrating how cultural frictions and infrastructure gaps are constitutive features that shape the daily realities of digital planning practice. In this way, it contributes to emerging scholarship that challenges dominant narratives of digital transformation by foregrounding the messy, contingent, and culturally embedded nature of planning digitalization (Kitchin et al. 2025b; Kummitha 2019). The chapter's central argument is that the cultural frictions and infrastructural gaps that characterize planning digitalization are not merely obstacles to be overcome, but are instead constitutive features that shape how digital systems actually function in practice.

The empirical analysis draws from recorded interviews undertaken in phases 1 and 2 of the Data Stories[1] project, which sought to examine issues relating to the full housing and planning data ecosystem in Dublin, Ireland, and a case study undertaken on behalf of the Local Government Management Agency (LGMA) focusing on the planning system exclusively. In phase 1, 125 recorded interviews were undertaken with 135 interviewees from across state, business, civil society, and university sectors, along with another 45 informal, unrecorded meetings with stakeholder actors from October 2022 to February 2025. Additional interviews with the state sector were also conducted as part of phase 2 of the project, for a case study on planning (which started in January 2025 and lasted until December 2025). The stakeholder quotes used in this chapter are from both phase 1 and 2 interviews. The case study research for the LGMA, undertaken in the summer of 2023, comprised interviews with 29 public sector officials within the planning system at local, regional, and national scales across 13 organizations, including 6 local authorities, two government departments, and five state agencies; most interviews were not recorded, and the funder stipulated that those that were recorded could not be quoted. Six interviews utilized a walk-through methodology, during which participants demonstrated their routine data workflows and elucidated system functionalities across various Planning Application Management Systems (PAMS). The research further encompassed

1 https://datastories.maynoothuniversity.ie/

a detailed analysis of user documentation, comprehensive data audits of five principal systems (in order to reconstruct their data architectures), and the systematic examination of downstream open data platforms and planning monitoring tools. This mixed-method approach facilitated a thorough understanding of both the technical infrastructure of individual systems and their interconnected relationships within the wider data ecosystem.

Digitalization and planning: between promises and practices

From initial experiments utilizing computers in planning in the 1960s to their widespread integration in the 2000s, the digitalization of planning practices has long been accompanied by powerful narratives of transformation that promise to address fundamental challenges that contemporary urban governance faces, such as climate change, housing quality and affordability, environmental degradation, and social inequalities and segregation (Klosterman 2012; Batty 2021). These narratives, promoted by technology companies, government agencies, and planning scholars alike, present digitalization as a pathway towards more integrated, efficient, participatory, inclusive and transparent planning processes (Batty 2013; Townsend 2013). The appeal of these promises lies in their apparent ability to resolve longstanding tensions within planning practice through technological innovation.

Integration might represent the most prominent promise of digital planning. Traditional planning systems have long struggled with fragmentation across different departments, scales of governance, and in terms of type of data (Healey 2006). Digital technologies appear to offer a solution to fragmented data silos by connecting previously disparate systems together, thereby enabling seamless data sharing, additional insights, for value to be extracted from datasets, and for coordinated analysis and decision-making (Geertman and Stillwell 2020). Efficiency constitutes another central promise of digital planning. The digitalization of formerly paper-based systems and the adoption of digital tools are positioned as solutions to the perceived slowness and bureaucratic inefficiency of traditional planning processes (Datta 2023; Devlin and Coaffee 2023). Automated data collection, algorithmic analysis, and streamlined approval processes all seek to reduce the time and resources required for planning activities, while improving both their quality and consistency (Batty 2018). This efficiency narrative is particularly powerful in contexts of austerity and resource constraints, where digital solutions appear to offer the ability 'to do more for less' (Lowndes and Gardner 2016).

Increased participation and stakeholder consultation represent another crucial promise of digital transformation. Online consultative platforms are promoted as tools for improving public engagement, thereby aiding consensus building, creating meaningful communication between experts and non-experts, and enhancing

planning decisions by more readily drawing upon local knowledge by reducing barriers to engaging in participatory planning (Bugs et al. 2010; Cardullo and Kitchin 2025). These barriers include the legalistic language, often associated with traditional planning consultation, and a lack of knowledge and time available for most citizens to participate in these formal processes (Wilson et al. 2019). More recent developments in locally configurable platform technologies for citizen engagement promise platform-mediated interactions that are specifically tailored to particular locations, rather than the more common 'worlding' approach in which platforms function in the same manner, regardless of where a user is located (Cardullo and Kitchin 2025). Digitalization is also believed to increase transparency by creating comprehensive standardized data flows that enable public scrutiny (Seltzer and Mahmoudi 2013). Interactive mapping tools and open data initiatives are presented as mechanisms by which to create more transparent planning processes through which decisions can be traced, verified, and assessed through objective data analysis (Janssen et al. 2012).

These promises of integration, efficiency, participation, and transparency are all embedded within broader imaginaries of digital governance that have gained prominence across multiple policy domains (Jasanoff and Kim 2015). Such imaginaries often present technology as a neutral tool by which to improve government performance and democratic accountability, while obscuring technological change's political and cultural dimensions (Morozov 2013; Eubanks 2018). Within the domain of planning, smart city imaginaries manifest in proposals for data-driven decision-making, algorithmic optimization of land use patterns, and in the sensor-based monitoring of urban conditions (Batty 2013). The e-government movement has similarly promoted digital technologies as solutions to problems of red tape, bureaucratic inefficiency, reducing opportunities for corruption, enhancing public access to government information, and fostering citizen engagement (Dunleavy et al. 2006; Janssen et al. 2012). These narratives often present digitalization as a technical fix for political and institutional problems, suggesting that technological innovation can overcome the limitation of existing bureaucratic arrangements. Finally, evidence-based policy discourse has also shaped digital planning imaginaries by promoting the idea that data-driven analysis and decision making will lead to more objective and effective policy decisions (Parsons 2002; Head 2008). This discourse positions digital technologies as instruments to reduce the influence of politics and ideology in planning decisions, allegedly allowing for more rational and scientific approaches to urban governance (Batty 2018). This narrative's appeal lies in its promise to resolve conflicts and to build consensus through (supposedly) objective analysis.

Empirical research on planning digitalization reveals significant tensions between these visions and everyday practices in planning authorities, despite the powerful appeal of digital governance imaginaries. These tensions arise from the gap

between the assumptions embedded within digital technologies and the complex realities of planning institutions, cultural aspects, and governance arrangements. For example, a fundamental tension concerns the ambition of having full data integration. Although digital platforms advertise their ability to connect disparate systems and processes, planning practice involves multiple stakeholders, all of whom have different interests, needs, tasks, ways of organizing and practicing work, and established legacy systems and databases that collectively produce significant operational frictions (Healey 2006; Edwards et al. 2011). Digital integration requires not just technical interoperability, but also coordinated institutional change management and cultural alignment and this is difficult to achieve in practice (Gil-Garcia et al. 2007). The results are often fragmented digital landscapes that reproduce, rather than resolve, existing institutional divisions.

The efficiency promise faces similar challenges when confronted with the complexity of planning practice. While digital tools can certainly automate certain routine tasks, planning involves multiple institutional stakeholders (e.g., planning authorities, state bodies, companies, civil society organizations) and types of actors (e.g., applicants, planning staff, internal commentators, prescribed and invited external commentators, the public, developers, architects, chartered surveyors, data analysts, system designers, and local system engineers), forms of judgment, negotiation, and contextual interpretation that all resist algorithmic processing (Jasper and Flyvbjerg 1999). Additionally, the introduction of digital tools often requires additional forms of labor (e.g., data entry, system maintenance, and user training) that can offset efficiency gains (Wilson and Tewdwr-Jones 2022). Transparency and improvements to data quality aim to tackle obstacles related to digital divides, technical literacy, and power relations. However, while digital platforms can make information more accessible, they can also create new forms of exclusion, especially for those with limited or no digital skills or access (Helbig et al. 2009). The design of digital participation tools often reflects the assumptions and preferences of their creators, rather than the needs and capabilities of diverse publics (Sieber 2006). The result can be forms of digital participation that reinforce, rather than challenge, existing inequalities in planning processes (Falco and Kleinhaus 2018).

These tensions suggest the need for more critical and nuanced analyses of planning digitalization that examine the social, cultural and political dimensions of digital transformation (Karvonen 2020). Digitalization is not a neutral technical process, but a place of ongoing negotiation between different actors, interests, and ways of understanding planning practice that needs further consideration.

Infrastructural realities: fragmented but functional

Our examination of the Irish planning system reveals how digital infrastructures operate as complex sociomaterial assemblages that resist the seamless integration promised by digital governance imaginaries, thereby demonstrating how system fragmentation, cultural frictions, and infrastructure gaps are constitutive features that shape the daily realities of planning practice (Kitchin et al. 2025a).

System fragmentation within the data ecosystem

A process of incremental digitalization has been underway since 2000, with a 'jerry-rigged' digital data ecosystem put in place gradually (Kitchin et al. 2025b). Various paper-based systems and processes were digitalized at different times and were interlinked across multiple actors. A set of PAMS were initially adopted by Ireland's 31 Local Authorities (LAs) in order to process planning applications: iPlan was used by 26 authorities, and APAS by 5 authorities (with each instance being locally configured). In 2015, two LAs transferred from iPlan to Odyssey. These systems are different with respect to data architecture, workflow organization, and functional capabilities. Each system possesses its own data dictionary, with marked variations in required fields (iPlan: 65 compulsory fields, Odyssey: 40, and APAS: 21) and optional fields (iPlan: 265, Odyssey: 409, and APAS: 194). iPlan and Odyssey both make extensive use of open text fields, whereas Odyssey and APAS employ both many check boxes and drop-down menus with fixed category choices. E-planning systems that enable the public to view key documents relating to planning applications were first introduced in 2003. The Building Control Management System (BCMS), used to track compliance with construction regulations, was introduced in 2014. The National Planning Application Database (NPAD) was launched in 2016 and is an interactive map system for viewing planning applications nationwide, and PleanIT, a case management system used by An Bord Pleanála (the national planning appeals body), was implemented in 2017. Data are shared between each of these different systems. For example, NPAD uses an automated Extract, Transform, Load (ETL) process called PETaL to import data from ePlan, and PleanIT ingests data from NPAD. However, these processes are frequently disrupted by technical glitches arising from differences in system architecture, firewall permissions, server configurations, and software updates. The result is that NPAD often displays incomplete information, with data from some authorities becoming temporarily absent until technical issues are resolved. Fragmentation is also evident in the persistence of paper-based processes alongside digital systems. As of August 2023, 12 LAs still required planning applications to be submitted as paper documents that were then scanned and entered into PAMS manually, thereby exemplifying the 'jerry-rigged' character of recent digital application. While An Bord Pleanála makes use of PleanIT, legal re-

quirements mandate that all digital materials must be printed and added to paper case files. In addition, applications made under different sections of planning legislation (e.g., Sections 5, 35, 42, 44, 57, 247 and Parts V, VII, and XI of the Planning Act) are often handled using separate systems, due to PAMSs being unable to process their data.

Variance across stakeholders

Another example of fragmentation can be found in the variance expressed in the ways that different stakeholders collect, process, and share planning data. These differences reflect deeper institutional, cultural, and political dynamics that shape the implementation of digital technology. For example, data workflows vary across LAs and even across those that are using the same PAMS. A telling example emerges in the compilation of official planning statistics by the Central Statistics Office (CSO). The CSO sends an Excel template to all 31 local authorities each month requesting standardized information on 14 variables for each planning application. However, the planning application management systems employed lack automated reporting functions, thereby requiring planning officers to extract and enter data manually (a process that consumes a week of work each month for each LA). The variability in data capture across different PAMS means that authorities may interpret the same data fields differently, while some ignore the CSO's template entirely, submitting data in alternative formats (including paper and scans of pdfs). A team of six CSO staff spend up to a month cleaning and standardizing the data in order to make it comparable between authorities, as described by an interviewee:

> "So, typically they would send us the data in their own formats. Unfortunately, it can vary quite a lot between local authorities. There is a local authority which still sends returns by paper. I won't name which one [...] but it can impact our turnaround times because of that. The formats they use, it could be PDFs of outputs they've taken from their own systems." (IP43, public sector worker)

Different levels of government and regulatory bodies, who play a part in the planning system, have differing priorities and these can come into tension at times, thereby constituting another element of fragmentation. A key priority described by one interviewee, who works for a national body, was ensuring equal access for all users:

> "We're not particularly interested in the politics across local authorities or even the politics between local authorities and the department. What we're interested in is the user journey. And actually, one of the principles that the government wants to adhere to is that every single resident in the island of Ireland should have exactly the same quality of service regardless of where they live. And what that does is it

> puts pressure on them [local authorities] collectively and individually. And they're starting to respond to that." (IP108, public sector worker)

However, an interviewee who works closely with local authorities expanded on the reluctance to streamline and to respond to national pressures:

> "We have 31 local authorities who are understandably keen to sort of maintain their own autonomy and independence and so on. And I suppose the cost of a new singular back office operation to administer your planning system and give you management information and all this sort of stuff would be quite considerable. It would be a brave local authority to put its hand up individually and say, 'well, actually, we're going to lead on this'." (IP65, public sector worker)

Both the desire to retain autonomy and independence through maintaining individual systems (such as iPlan, APAS, or Odyssey) and the cost of creating and maintaining nationally standardized digitized planning systems with the capacity to produce data outputs that are comparable, interoperable, and real time create considerable tension. These factors all contribute to ongoing fragmentation within the system.

Good enough and everyday maintenance

The notion of 'good enough' functionality challenges dominant narratives of digital transformation that emphasize optimization and seamless integration. In the Irish context, 'good enough' represents achieving sufficient operational performance given contextual factors, such as a complex regulatory environment, limited funding, understaffing, and incremental digital adoption (Kayanan et al. forthcoming). Rather than representing failure, this condition can be understood as situated functionality emerging from the ongoing negotiation between technological capabilities and institutional realities. The system might not be perfect, but at an operational level, the planning system demonstrates robust, 'good enough' functionality in core tasks to satisfy the expectations of managers, staff, and stakeholders.

Local authorities successfully process thousands of planning applications annually with PAMS that enable case management, timeline tracking, fee monitoring, and decision recording. The systems facilitate consultation processes, support public access to planning information, and maintain the extensive documentation required to make planning decisions. The limitations of 'good enough' functionality become apparent when the system struggles to perform tasks beyond the original design parameters. This attitude was described by an interviewee as follows:

> "Hard-nosed local authority chief executives would say, 'look, the system works fine as it is. It mightn't produce, you know, the most beautiful data sets at a na-

> tional level, but that's not my problem. If the department [Department of Housing, Local Government and Heritage] wants that, fine; if they rock up with a cheque for 15 million, you know where I am'. And that's the narrative, that's the rhetoric around that space." (IP65, public sector worker)

The construction of achieving 'good enough' status depends on the labor of planning professionals who must interpret system requirements, make judgments about data categorization, manage tensions between standardized forms and contextual specificity of individual planning cases, and must practice forms of maintenance and repair that keep systems functioning. The latter includes performing data cleaning and wrangling, patching software and performing systems upgrades, fixing system errors, and liaising with technical and other staff, as well as with applicants, to address issues arising in processing tasks (Graham and Thrift 2007). At the same time, the variability in data entry practices, with some staff entering minimal information and others providing comprehensive detail, demonstrates how planning data quality emerges from situated professional judgments, rather than from automated technical processes. Moreover, planning professionals expressed concerns that overly standardized systems might reduce their capacity to respond to local contexts, thereby potentially undermining the contextual sensitivity that they consider essential for effective planning practice. Resource pressures, created by austerity, have intensified cultural tensions by creating conditions in which planning staff must prioritize essential functions while also managing increased workloads with a reduced capacity. This has led to 'tactical resistance' through practices such as minimal data entry, delayed responses to system requirements, and selective engagement with digital processes. These practices represent attempts to manage competing demands and to preserve capacity for core planning work, but also contribute to data quality and consistency problems.

Cultural and political conditions

The fragmented and 'good enough' character of Ireland's planning digital infrastructure must be situated within broader cultural and political conditions that have shaped its development and operation. These conditions include the material constraints of austerity governance, tensions between local autonomy and centralized standardization, and everyday practices through which planning professionals negotiate digital technology demands. Understanding this resistance requires understanding the political economy and economic context in which Irish governance operates, as well as Ireland's distinctive historical relationship with data standardization, including the late introduction of basic spatial data infrastructure like postcodes (only implemented in 2015), the absence of a comprehensive cadastral system,

and persistent opacity around land ownership that has created cultural comfort with informal, locally managed information systems.

Since the late 1980s, Ireland has adopted a decidedly neoliberal approach to government, with a relatively lean public sector, low corporate taxation, light-to-no regulation of market activities, the marketization of public services, public-private partnerships, and developer/speculator-led planning (Kitchin et al. 2012). Initially, this gave rise to the Celtic Tiger period (1993–2007), characterized by rapid economic growth driven by foreign direct investment, a strong increase in population, and a property boom. This 'economic miracle' was halted, however, by the global finance crisis, manifest in the Irish case by an oversupply of property. The austerity measures following the 2008 financial crisis extended the under-resourcing of local authorities, with staff numbers falling by nearly 24% between 2008 and 2015 (DELG 2015; DEHLG 2008) and budgets being reduced by more than 22% (DPER 2024). In turn, these constraints have created 'defensive demarcation' behaviors, where local authorities resist central government standardization initiatives while defending their autonomy over IT system choice and configuration. However, this apparent assertion of autonomy often masks underlying resource constraints, given that some local authorities find themselves adopting particular systems not as expressions of genuine choice, but because they lack either the financial capacity to afford preferred alternatives or the technical resources to facilitate transitions to more suitable platforms. This resistance reflects legitimate concerns about digital standardization implications for local flexibility and professional judgment, but also draws on deeper cultural patterns where Ireland's historical lack of standardized land and property data systems has normalized fragmented approaches to information management.

These cultural patterns and fragmentations were revealed through discussions with Land Development Agency (LDA) staff, with respect to public land management, who pointed out that even the most fundamental question of public land inventory remains unresolved:

> "So, public land being lands owned by a public body: Where it was [the land], who was using it, what were they using it for, and could or should it be used for housing? That was the original theory of the LDA, but there was no single data set of public lands." (IP36, public sector worker)

This absence of centralized data extends beyond mere oversight and reflects deeper institutional fragmentation:

> "A lot of local authorities just don't know what they own and haven't been able to compile this data set." (IP36, public sector worker)

The implications of this data opacity become starkly apparent when asking the most basic questions about ownership and jurisdiction. As one staff member noted with characteristic understatement:

> "A lot of the country isn't registered; we don't know who owns what. Particularly when it comes to the data that I'm looking at, because a lot of the state lands are historic structures. Nobody can tell me who owns the Custom House. I can see it from the window. It was built by a King or Queen 250 years ago. The OPW [Office of Public Works] maintain it and look after it and cut the grass and fix the windows. The Department of Housing are stationed there, and they have been for years. But who owns the building? Nobody knows." (IP36, public sector worker)

This confusion extends to administrative evolution itself, where bureaucratic restructuring has created additional layers of uncertainty:

> "Other problems with the data that I have, is that I found in the last search I did for the PRAI [Property Registration Authority of Ireland], I found about, I can't remember, 30 odd sites registered to the Department of Energy. And we haven't had a Department of Energy since 1980. […] The government departments change their name all the time. And nobody re-registered their sites." (IP36, public sector worker)

These examples illustrate how Ireland's planning digital infrastructure reflects not merely technical limitations, but also fundamental challenges in cultural and institutional memory and capacity that have profound implications for contemporary digital governance initiatives. The cultural familiarity with working with incomplete information systems may contribute to the acceptance of 'good enough' digital solutions and to the resistance to comprehensive standardization that threatens established professional competencies in navigating fragmented data landscapes (Curtin 2025). International research reveals similar patterns, where planning professionals express ambivalences toward digital transformation, thereby recognizing potential benefits while resisting changes that threaten professional discretion and established ways of working (Kuppler and Fricke 2024; Daniel et al. 2023).

Conclusion: Grounding digitalization in cultural and material realities

This analysis of digitalization in Irish planning reveals three key findings that challenge the dominant narratives of digital transformation. First, digital planning infrastructures emerge through incremental, 'jerry-rigged' digitalization, thereby creating fragmented digital landscapes with multiple incompatible systems that resist seamless integration. Second, these fragmented systems achieve 'good enough'

functionality for core statutory obligations while experiencing clear limitations when performing tasks beyond their original design parameters. Third, cultural and political conditions, including austerity measures, institutional tensions, and professional concerns about standardization, all fundamentally shape how digital technologies are implemented and operated in planning contexts. The Irish case demonstrates that digitalization in planning is fundamentally a sociomaterial and cultural process, rather than a purely technical transformation.

Digital planning systems emerge from complex negotiations between technological possibilities and institutional realities, professional cultures, and bureaucratic requirements. These negotiations are ongoing, rather than being resolved through initial implementation, and require continuous adaptation, renegotiation, and maintenance as the systems evolve. The cultural aspects of digitalization often appear as constraints to technological transformation, but the Irish experience suggests that cultural resistance and adaptation serve important functions in maintaining the flexibility and contextual responsiveness that planning professionals consider essential for effective practice. Rather than viewing cultural factors as impediments to be overcome, this analysis suggests that a successful digital transformation in planning requires attention be paid to the cultural work of aligning technological capabilities with professional values and institutional practices. The persistence of multiple PAMS across different authorities reflects not simply resistance to change, but legitimate concerns about the implications of standardization for local flexibility and professional judgment.

The sociomaterial character of planning digitalization is evident in how the meaning and functionality of digital systems emerge from their embeddedness within specific institutional contexts, professional practices, and material constraints. The same technology may function very differently between different planning authorities, depending on local configurations, staffing levels, and institutional cultures. This situatedness means that the effectiveness of digital planning systems cannot be assessed solely through technical performance metrics, but requires that attention be paid to how they support the complex, contextual work of planning practice.

Our analysis has several important implications for both planning practice and research on digital governance. For planning practice, the findings suggest the need for more realistic expectations about what digital technologies both can and cannot accomplish. Rather than expecting digital tools to resolve fundamental tensions in planning work, practitioners and policymakers need to understand how digital technologies become rolled into ongoing negotiations about values, priorities, and appropriate forms of knowledge. For research on digitalization, our study demonstrates the value of ethnographic and practice-oriented approaches that examine how digital systems actually function in everyday institutional contexts, rather than focusing solely on either policy intentions or technical specifications. The gap be-

tween digital governance imaginaries and material realities revealed in the Irish case suggests the need for more critical and grounded analyses of digital transformation. By grounding digitalization in its cultural and material realities, we should be able to develop more sophisticated understandings of how technology and society are mutually constituted and how digital transformation might be guided toward more democratic, sustainable, and contextually responsive outcomes.

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Corresponding author: Juliette.Davret@mu.ie

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