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21. The nature and development of a planning data ecosystem

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INTRODUCTION

In this chapter, we provide an analysis of the nature and development of data ecosystems, using a case example of the development and control data ecosystem of the Irish planning pipeline. This data ecosystem enables the assessment and tracking of the entire development pipeline from planning application, to appeal, to construction, and the provision of official statistics and open data.

A data ecosystem consists of a set of inter-related data systems that are functionally inter-linked and share data to some degree, and collectively enable all the tasks that make-up a domain of work to be undertaken (Van Schalkwyk et al., 2016; Oliveira and Loscio, 2018; Scassa, 2019). Data

ecosystems do not come into the world ready-made, nor do they remain static (Bowker and Star, 1999). Rather, data ecosystems are constructed over time, often in quite a piecemeal fashion, constantly evolving 'as new ideas and knowledges emerge, technologies are invented, organizations change, business models are created, the political economy changes, regulations and laws are introduced and repealed, skill sets develop, debates take place, and markets grow or shrink' (Kitchin and Lauriault, 2018: 9). Initial studies of technical infrastructure development tended to posit that data ecosystems are created through linear phases of progression: planning, procurement, construction, growth, maturity, decline, and demise (Engels, 2020; Monstadt, 2022). These phases might overlap, or there could be some backtracking, but development follows a sequential path (Carse and Kneas 2019). The trajectory of this path is largely determined by founding ideas and decisions, and as initial technologies, work practices, and systems of management and governance become embedded, a path dependency develops that produces a self-reinforcing direction of travel (Rast, 2012).

More recently, and as we will show with the case of the Irish planning data ecosystem, this predetermined, sequential and teleological path-dependent model has been challenged. For example, Carse and Kneas (2019) note that technical infrastructures (such as a data ecosystem) rarely follow an anticipated, linear trajectory, experiencing blockages, delays, realignments, and obsolescence that add dead-ends, retreats, and knots to the path experienced. Components that were added at an earlier stage might be decommissioned or replaced (in effect, over-writing them with new systems that perform a different set of tasks). Moreover, aspects of development can be divergent, with several related components unfolding over time in variable ways, even though they are part of the same data ecosystem. For example, different organisations might rollout, configure, and deploy the same data system in varying ways, or employ different data systems to perform the same tasks. Nonetheless, while data ecosystems unfold in a contingent, relational, contextual manner, and are open to critical junctures (radical shifts in their constitutions, such as the transition from paper to digital, or abandonment), their development is not an open-ended horizon. Rather it is conditioned by enduring and resilient existing socio-technical arrangements (Tutton, 2017). In this sense, those responsible for innovating a data ecosystem 'are heirs before they are choosers' (Rose, 1990: 263).

The chapter is divided into four sections. First, we introduce the Irish development and control data ecosystem. Then, we discuss the nature of data ecosystems, making a case for conceiving of them as an assemblage of data assemblages. We then add context to this new framing by highlighting how data mobility between data systems and actors is central to the constitution and processes of a data ecosystem and how data frictions can disrupt operations. This is followed by an examination of how data ecosystems develop and evolve over time, detailing how our case example has changed over a 25-year period from 2000 to 2024, and a brief conclusion.

THE IRISH PLANNING DEVELOPMENT AND CONTROL DATA ECOSYSTEM

The Irish planning system is divided into three main blocks of work: (1) strategic planning, (2) development and control, and (3) enforcement and compliance. Strategic planning outlines the type of development that will occur over multiple years at local and regional scales. Development and control assesses planning applications and appeals. Once permission on an application is secured, this stage also monitors building control requirements during construction. Enforcement and compliance involves checking whether a development complies with the conditions of planning permission and, if not, taking necessary legal action. Here, we focus exclusively on the development and control functions of the planning system. The key organisations are the 31 local authorities (LAs), which administer local government in Ireland and act as planning authorities; An Bord Pleanála (ABP[1]), the national appeals authority; the National Building Control and Market Surveillance Office (NBCMSO), which tracks building control; the Local Government Management Agency (LGMA), which oversees the work of local authorities and provides some planning IT systems; and the Department of Housing, Local Government and Heritage (DHLGH), which is responsible for planning provision and manages some planning data resources. More than simply exchanging data, the various organisations and actors collaborate, reinforcing the interconnection of a data ecosystem as well as its socio-technical character.

The rationale for digitalisation and the on-going development of data ecosystems in planning (and other state services) is to increase efficiencies and reduce costs, gain new tools that enhance the range and sophistication of services delivered, create spillover effects through new data resources (e.g., evidence-informed practice and policy), develop more transparent, accountable and participatory decision-making processes, enhance citizen experience of government (through on-demand, online services), and ultimately improve public services (Silva 2010; Daniel et al., 2021).

Mass digitalisation and datafication of state services with the adoption of e-government and e-governance has led to paper systems being replaced by digital data systems (Dunleavy et al., 2006; Falk et al., 2017). The result is increasingly complex data ecosystems with enhanced scope, scale, functionality, use, and data sharing. Just about every digital data system employed within an organisation is bound into at least one data ecosystem given that they rarely operate in an isolated, standalone manner but rather as part of a constellation of networked technologies.

Bureaucracies within the public and private sector have long been reliant on data ecosystems to work effectively. For example, the development and control function of the Irish planning system has, since its inception in 1963, with the enactment of the Local Government (Planning and Development) Act, consisted of an amalgam of inter-related and connected data systems that form a data ecosystem. Prior to the 1990s, all data were captured in paper form through standardised

procedures, stored in the ledgers, folders, and file cabinets of different officials and departments, and data and decisions were passed between teams and institutions as a planning application progressed along the development pipeline. From 2000 onwards, the various tasks of development and control have been subject to digitalisation and datafication, with paper-based processes being replaced or complemented by digital counterparts, along with some born-digital elements.

Figure 21.1 demonstrates the development and control pipeline data ecosystem pre-2000. The ecosystem consists of planning application and building control, both administered by the local authority; appeals, administered by ABP; and downstream users of the data: the Department of the Environment and Local Government (DELG), the Central Statistics Office (CSO), and private companies collating data from across local authorities.

At this time, most of the data ecosystem was operating using paper-based processes. Applicants submitted paper forms and prints of site layouts and architectural drawings. Requests for feedback on whether applications complied with development plans, laws and regulations, and national and local policy, were mailed to internal units in the local authority (e.g., transportation, environment, archaeology, and heritage departments) and external parties (e.g., relevant government departments and state agencies), and returned letters were noted in ledgers and filed in folders and filing cabinets.

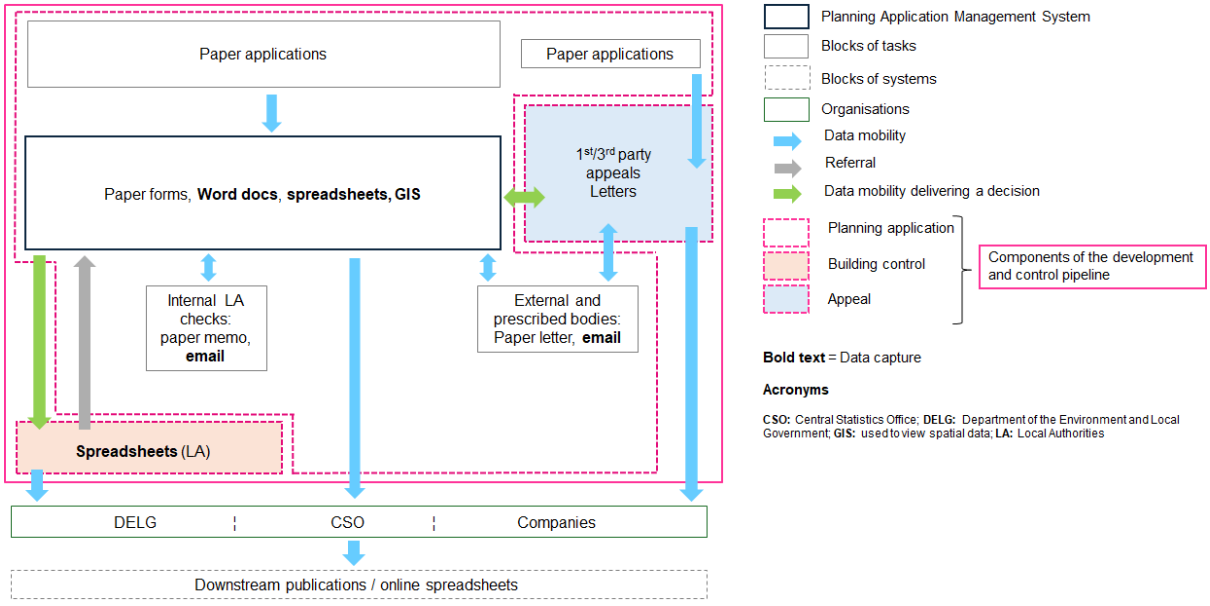

Figure 21.1 A data ecosystem as an assemblage of data assemblages: Irish development and control pre-2000

Figure 21.2 charts the data ecosystem as of August 2023, its various data assemblages, the actors primarily responsible for their operation and management, and their interconnections. The chart is loosely organised sequentially from top-to-bottom, with different data assemblages being used to

manage different stages of the development and control process from application, through assessment, appeal, construction, and the production of official statistics and open data. The data ecosystem operates without any one entity being in charge, and without its actors necessarily knowing how the ecosystem as a whole fits together and operates. In fact, most of the 29 people we interviewed to map out the data ecosystem had little conception of it beyond the data systems they interacted with on a regular basis.

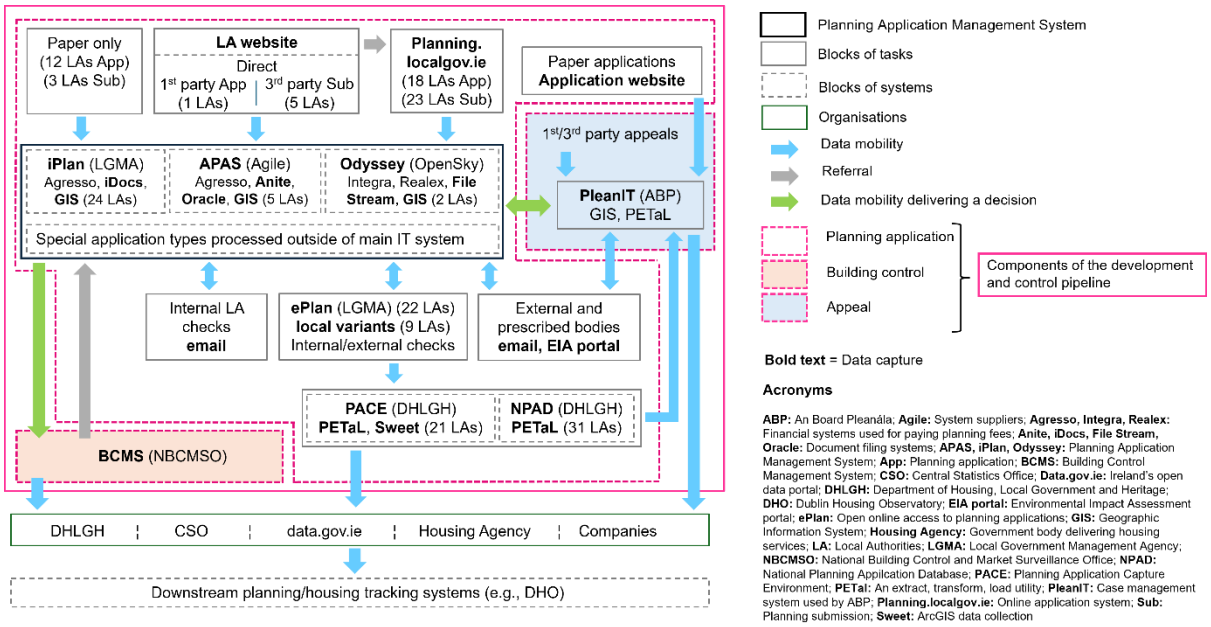

Figure 21.2 The development and control data ecosystem in August 2023

At the top of the chart is the process of applying for planning permission. In August 2023, the digitalisation process remained partial. Twelve LAs still required paper applications, and three only accepted third party submissions as a written letter. Likewise, ABP only accepted paper applications, though for large developments it requested that the applicant set up a website that hosted all relevant documents in digital form. For legal reasons, ABP printed out any digital material sent to them, such as emails, and added them to their paper case files. Eighteen LAs had adopted planning .localgov .ie as a portal for digital submission of applications, and one LA used their own portal. Data submitted via these portals were imported directly into the planning application management system (PAMS), whereas the paper submission had to be digitised and added to the system manually. At the time, there were three main variants of PAMS used by the 31 local authorities: APAS used by 5 LAs; iPlan used by 24 LAs; and Odyssey used by 2 LAs (who by the end of 2023 had transferred to APAS). In the case of the LAs using APAS, each locally configured the system to its own needs, with each instance quite different in terms of design and workflow. While the planning application management systems are used to process the vast majority of applications, limitations in their functionality meant that a number of specialised applications were handled outside them.

After initial checking of submitted materials, selected details of the application are passed into an ePlan system, which allows the public to inspect the proposed development online. Feedback is also sought on every application from internal LA units (e.g., transportation, environment, archaeology, and heritage departments) and selected external bodies (e.g., Office of the Planning Regulator) and prescribed bodies (e.g., Department of Housing, Local Government and Heritage (DHLGH[2]); Transport Infrastructure Ireland; Health Service Executive) via email, ePlan, or the EIA (Environmental Impact Assessment) portal. Selected data (up to 25 fields) are extracted from each LA's ePlan site using an automated ETL (extract, transform, load) process (PETaL) and imported into NPAD (National Planning Applications Database) and PACE (Planning Application Capture Environment). NPAD provides an open, online, interactive mapping tool to view all planning applications made to each of the 31 LAs since 2012. PACE is a standardised tool for digitally capturing the site boundaries of planning applications. If a planning application is unsuccessful, then an appeal can be made to ABP, who use their own case management system, PleanIT. Once permission is given for a development to proceed, the building control phase is initiated by notifying commencement to the Building Control Management System (BCMS) run by NBCMSO.

Selected data are also shared with third parties for the production of official statistics and use as open data. In the case of the CSO, the 31 LAs and ABP submit, on a monthly basis, 14 data fields relating to each granted planning permission in order to comply with the statutory provision to supply Eurostat with necessary data. Other selected data are shared with the DHLGH and the Housing Agency, some of which are made openly available on their data hubs and via data .gov .ie (the national open data site). These data are imported into several public planning and housing tracking systems that provide open dashboard visualisations and interactive maps for monitoring key performance indicators (e.g., the DHLGH Housing Delivery Tracker[3]; the Dublin Housing Observatory). In addition, data held in ePlan and BCMS are scraped by private companies on a daily (Construction Information Services Ireland – CIS) and weekly (Building Information Ireland – BII) basis and converted into commercial data products. CIS and BII validate the data and clean and wrangle them into more useable forms, link them to other datasets (such as procurement data scraped from e-tender portals), and produce analysis tools that enable site development to be tracked from permission to completion. Through the provision of open data and commercial services, the reach and utility of the data ecosystem is massively extended.

EXPANDING THE CONCEPT OF DATA ECOSYSTEMS

In the Critical Data Studies literature, a data ecosystem is understood in socio-technical terms. For the most part, the term 'ecosystem' is used in a metaphorical sense to evoke the notion that there are critical interdependencies between actors and data systems. However, van Schalkwyk et al. (2016)

have used the term in a more analogous manner, using the language and ideas of biological ecosystems theory to argue that data ecosystems involve co-determinate and symbiotic relationships between mutually interacting 'organisms' (firms, institutions, customers, etc.), including 'keystone species' such as data intermediaries (e.g., research and training consultancies) that create the conditions for successful data systems within organisms and collaboration between them. In this context, relationships between organisms are seen as cyclical and reinforcing, with interdependencies existing between organisms, their data systems, and resources, enabling adaptation and resilience (van Schalkwyk et al., 2016). For us, while this analogous framing might have appeal, opening the black box of the Irish planning data ecosystem and charting changes over time has demonstrated that the framing insufficiently captures the social, political and governance/legal arrangements and interdependencies between actors and data systems, their processes, data mobilities and data frictions, and how they develop over time.

Building on some of our previous work, instead we think that data ecosystems are best understood through assemblage thinking (Kitchin 2022). Here, each data system is cast as a data assemblage, and a data ecosystem consists of an assemblage of data assemblages (DeLanda, 2016). Kitchin (2014) defined a data assemblage as a socio-technical arrangement composed of many apparatus, actors, and practices whose central concern is the production, management, analysis, and sharing of data. He proposed that a data assemblage consisted of the thorough intermeshing of a technical and contextual stack of objects, processes, and relations that together compose a data system. The technical stack is, in effect, the embodiment of the data architecture – the component technologies (e.g., network, hardware, operating system, database, software, interface) that comprise the instrumental means by which data are generated, processed, stored, shared, analysed, and experienced. The contextual stack consists of all the discursive and material elements that shape how a data system is built, operates, and is maintained over time (e.g., systems of thought, forms of knowledge, governmentalities, finance, marketplace, individual actors and communities). Together the technical and contextual stacks work to produce and maintain a data system and define what is 'possible, desirable and expected of data' in relation to a task or domain (Kitchin, 2014: 24). From this perspective, data systems are never a neutral and objective means of capturing, processing and sharing data, but rather are contingent and relational in nature; they are the product of data politics and data power, and they reinscribe and reproduce these relations (Kennedy et al., 2015; Ruppert et al., 2017).

More recently, we have recast Kitchin's original formulation of a data assemblage, which was rooted in Foucault's (1980) notion of a dispositive, to align it with assemblage theory as conceived by Nail's (2017) reading of Deleuze and Guattari (1987) (see Kitchin et al., 2025a). Nail notes that Deleuze and Guattari's vision of assemblage theory considers how a heterogeneous set of elements – that can be loosely categorised into three basic types (conditions, objects and agents, or what they call 'abstract machine', 'concrete assemblage' and 'personae') – are entwined through a set of contingent,

relational arrangements to (re)produce an assemblage. As Allen and Vollmer (2018: 27) note: ‘‘Conditions’ are the abstract, governing ideas and sets of relations that connect objects and agents in meaningful ways. ‘Objects’ are the concrete parts that get arranged in particular ways. ‘Agents’ are those people who arrange the objects according to the prevailing conditions.’ All three types of constituent elements are necessary for an assemblage to be produced, sustained, and to operate. Following this formulation, Kitchin’s (2014) technical and contextual stacks, and their component parts, are recast into the three elements of conditions, objects, and agents (see Figure 21.3).

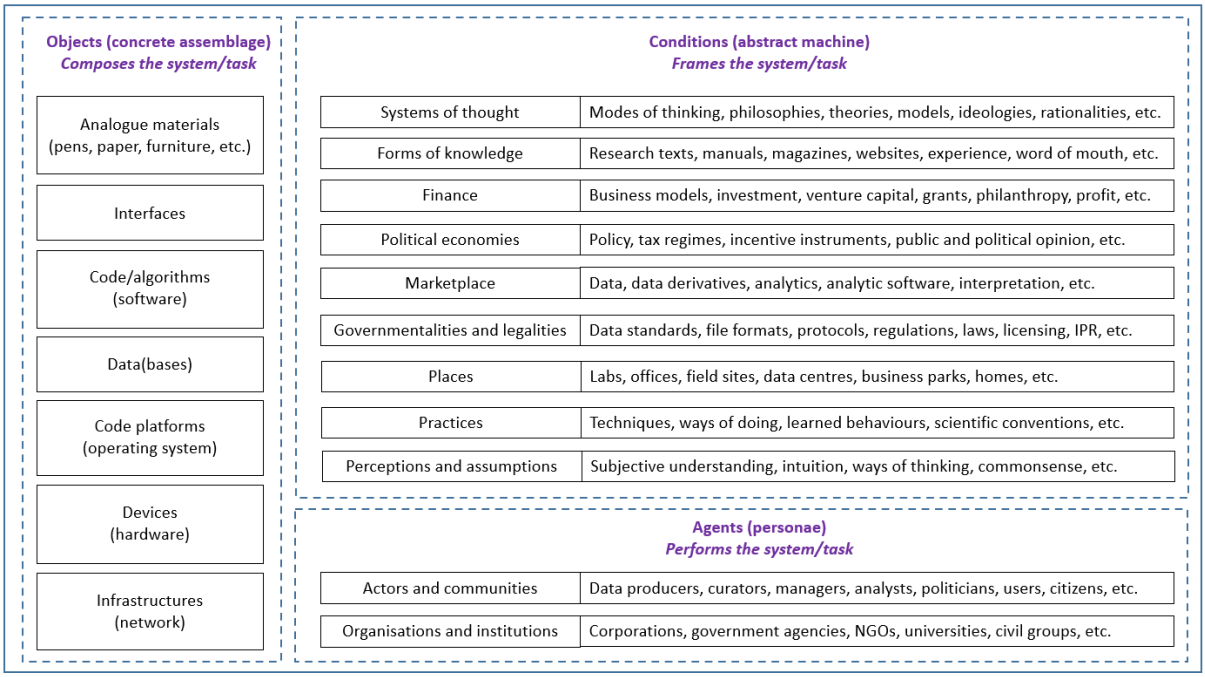

Figure 21.3 The conditions, objects and agents that make-up a data assemblage

Data assemblages can themselves be progressively scaled into larger assemblages (DeLanda, 2016). A scaled data assemblage is bound together by shared goals and legislative mandates and supported by institutional (e.g., strategic partnerships, contracts, licensing, memoranda of understanding) and technical (e.g., protocols, data standards) arrangements, and its operations are guided by regulations, values, and norms. Figure 21.4 illustrates how a data ecosystem consists of an assemblage of data assemblages, and how it operates through data mobilities in which data and instructions are parsed between the data assemblages.

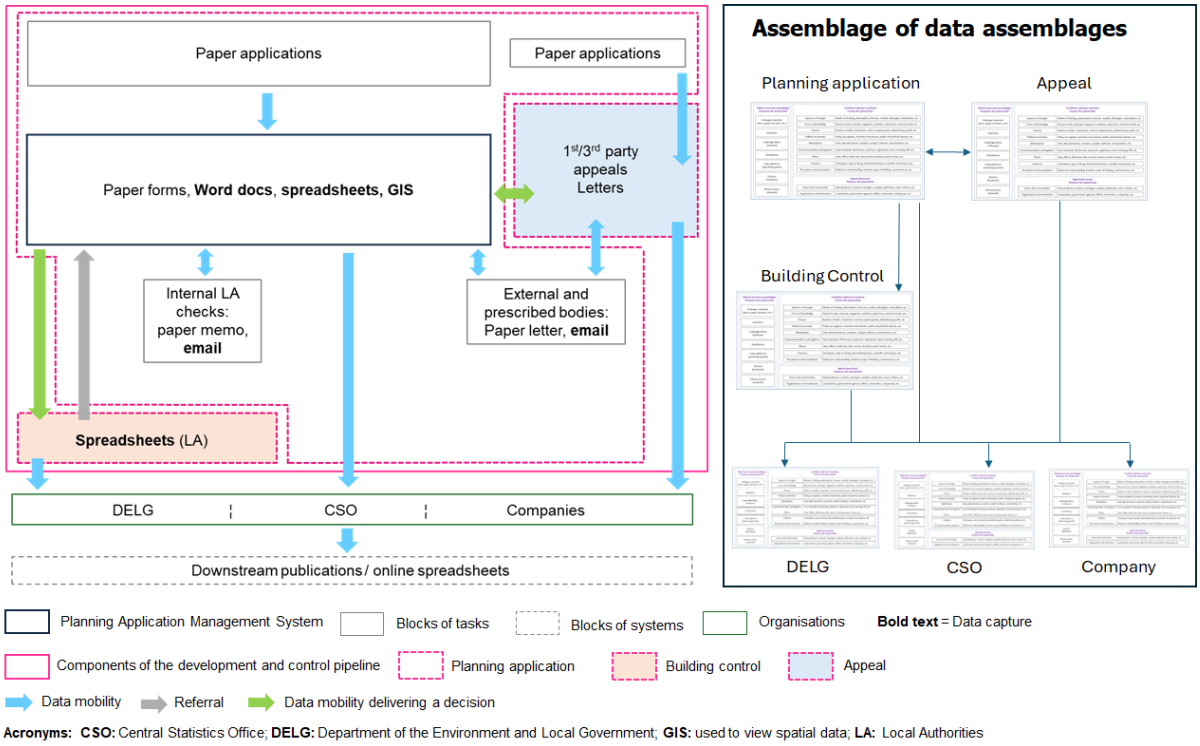

Figure 21.4 A data ecosystem as an assemblage of data assemblages

The left side of the figure is a replica of Figure 21.1 from the previous section, though it could just as easily be Figure 21.2 or any of the data ecosystems we show in our 25-year chronology in Figure 21.6 (below). The right side of Figure 21.4 represents the same data ecosystem, but it highlights that the ecosystem consists of interlinked data assemblages, each shaped by their institutional conditions, objects and agents: LAs administering planning applications and building control; ABP administering appeals; the DELG, CSO and the private company extracting planning data. Each of these entities operates within its own distinct framework, producing and managing data according to its particular mandates and regulatory environments. Together, these assemblages form a larger, dynamic ecosystem in which data flows and transformations are influenced by various institutional, technical, and political factors. In concert, these represent an assemblage of data assemblages.

As our case illustrates, a data ecosystem, as an assemblage of data assemblages, does not emerge in a linear or pre-determined fashion. Rather, its construction and evolution unfolds through interlinked processes of visioning needs, articulation of actions, scaffolding resources, and overwriting outdated elements.

Visioning is a process of identifying an issue to be solved and devising a general approach for how to solve it. In our case, identifying the need to construct a coherent, functional data ecosystem to support the full pipeline of development and control functions of the planning system. The visioning might be quite modest and limited to expanding one part of the data ecosystem, rather than the

ecosystem as a whole. Or it might be limited to a relatively short time horizon, rather than being designed to anticipate how a data ecosystem might evolve over time. Indeed, as we detail below, data ecosystems are rarely conceived fully formed or put into place all at once; rather, they are jerry-rigged together over time as new developments occur (e.g., new regulations, new processes, new technologies).

Articulation refers to the process of turning this vision into a plan of action: identifying, scheduling, coordinating, and monitoring of all necessary tasks – and the steps within these tasks – to complete a job (Kaltenbrunner, 2015; Tanweer et al., 2016). In essence, articulation involves planning the workflow and resources needed, and aligning relevant actors to undertake tasks and to construct and maintain systems and processes (Nadim, 2016). Each stage might be separately articulated, with the stages then meshed together.

Scaffolding involves assembling the resources needed – data, technologies, finance, governance, and personal and institutional relationships – and constructing the bureaucratic structures and procedures and technical systems to fulfil these articulations (Halfmann, 2020). Scaffolding helps realise articulation work by providing the means to achieve its ambition. Once the various components are scaffolded into place and are fully operational, the scaffold can be removed (e.g., discontinuing working groups established to realise the articulation) (Halfmann, 2020). Over time, new components might be articulated and scaffolded into the data ecosystem.

As the ecosystem develops, overwriting reshapes its existing components, whether by upgrading, replacing or repurposing them, thus creating a palimpsest layering of a data ecosystem (Engels 2020). For example, the process of digitalisation has meant that paper-based components of a data ecosystem become over-written by digital data systems, or spreadsheets might be over-written by relational databases. This process does not erase previous structures entirely but instead builds upon them, layering new technologies and practices over time.

Longitudinally then, as our case study demonstrates, data ecosystems evolve and change through these four processes, with existing data assemblages being reconfigured and new data assemblages added and placed in relation to others in response to evolving needs.

DATA MOBILITIES AND DATA FRICTIONS

As the various arrows in the figures above indicate, the development and control data ecosystem is dependent on data sharing between data systems to undertake key tasks and to enable a planning application to pass from submission to completed property. Indeed, data mobilities are a constituent feature of data ecosystems, binding data systems together through co-dependent interconnections (Bates et al., 2016). Given the characteristics of data ecosystems outlined in previous sections of this

chapter, these mobilities of data are complex and may be slowed or prevented by different kinds of friction.

The diversity and complexity of the interactions between data systems is made clear when one charts them for just one part of the data ecosystem. For example, Figure 21.5 documents the interactions between agents and data systems for the planning application stage that manages and tracks the progress of an assessment along a prescribed timeline, including sourcing additional information and feedback, monitoring fee payment, tracking all communications with the applicant and third parties, and noting observations and decisions (we have produced such data mobility diagrams for the pre-planning, appeals, and building control functions; see Kitchin et al., 2025b). The mobility of data is facilitated by data management and governance mechanisms, such as metadata, data dictionaries, data standards, and transfer protocols that enable interoperability (Millerand and Bowker 2009; Gal and Rubinfeld 2019).

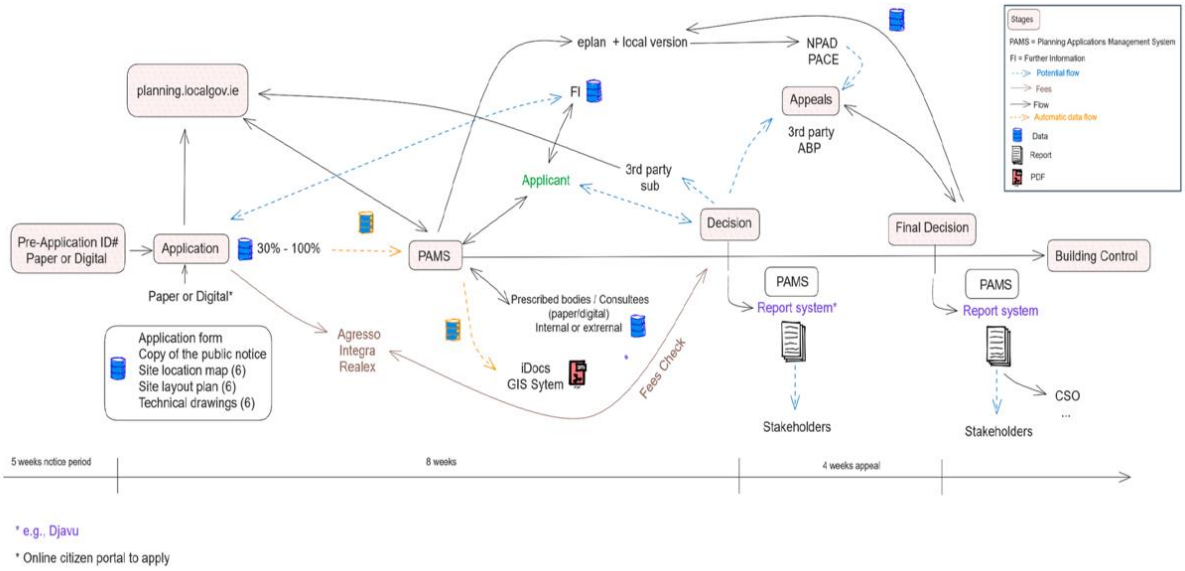

Figure 21.5 The data mobilities of the planning application stage

Data frictions are impediments or blockages that prevent or slow data mobilities, or make them difficult between data systems (Bates 2018). Data frictions create inefficiencies, place limits on the functionality and utility of data systems within a data ecosystem, and can produce a fragmented rather than coherent data ecosystem (Kitchin and Moore-Cherry, 2021). However, data frictions are not always negative in effect; for example, some data frictions exist for good reason, such as protecting privacy or ensuring data security (Bates 2018). Data frictions can be technical in form (e.g., incompatible data formats, glitches), but can also be socio-material in nature, influenced by factors such as institutional capacity (e.g., skills, time, resources), organisational structures and cultures, workflows, habits, routines and affects (e.g., trust, enthusiasm, frustration) (Pink et al., 2018). Bates (2018) thus identifies three broad sets of factors that influence the nature and form of data frictions:

data sharing infrastructure and management, regulatory frameworks, and socio-cultural issues. All three are present in the Irish development and control data ecosystem.

When it comes to the management of planning applications, the data ecosystem is prone to glitches. One common glitch occurs with respect to the PETaL process that imports data into NPAD. PETaL has to access six kinds of eplanning systems to extract data (ePlan plus 5 variants), which are different in form. The process is not straightforward and many planning applications displayed in NPAD do not have the full suite of associated variables due to glitches caused by changes to firewall permissions, server configuration and data formats, software patches and upgrades, loss of permissions, and network issues. It can take time to address these glitches as many LA planning departments do not have the time and/or expertise to resolve such issues, leaving it to the DHLGH to repair outages, which may involve site visits. The workflow for each PAMS is also organised differently, though each is designed to achieve the same ends. Even across LAs using the same data system (e.g., iPlan), different LAs might locally configure workflows, with modifications made to cater for localised ways of meeting local needs. Moreover, not all types of planning applications can be managed in all PAMS.

In addition to differences in workflow and design across PAMS, there is a lack of data standardisation. The data dictionaries for each PAMS vary substantially in terms of data capture. For example, there are marked differences in the number of required fields that planners must enter into each system (see Table 21.1). With respect to the three data systems for which we constructed full data dictionaries, iPlan had 65 required fields, Odyssey 40, and APAS 21 (these required fields might need to be entered multiple times in the system). This variance is important as it is only possible to compare equivalent data for every planning application across the 21 required fields for APAS, although not all 21 of these variables are also captured in iPlan and Odyssey. They also might not be required fields in other instances of APAS. Similarly, the three PAMS had a variable number of optional fields: iPlan 265, Odyssey 409, and APAS 194. Not only do the required fields vary, but also how the data are captured. For example, iPlan uses relatively few check boxes (9) compared to Odyssey (48) and APAS (55), and Odyssey makes greater use of dropdown menus than iPlan or APAS. The use of open text fields, used reasonable extensively in iPlan and Odyssey, enables bespoke information to be recorded, but also means that the data recorded lack standardisation. Again, this reduces the ability to directly compare data that have been captured in different PAMS without a substantive amount of data cleaning and data wrangling. Another standardisation friction is the lack of a common reference ID for proposed plans across systems. Instead, a unique ID is assigned for each stage and data system: planning application (PAMS), appeals (PleanIT), and construction (BCMS), making it difficult to track the development of a site from start to finish along the planning and construction pipeline.

Table 21.1 Required and optional fields and mode of data capture in PAMS

		iPlan	Odyssey	APAS
Required field	Total	296	63	26
	without duplicate	65	40	21
Optional field	Total	961	616	215
	without duplicate	265	409	194
Type of field	Total Free text (number or text)	585	304	76
	without duplicate	163	190	68
	Total Check box	9	48	55
	without duplicate	6	42	50
	Total Dropdown menu	135	206	38
	without duplicate	57	135	31

Where the issue of data system design and data standardisation is felt most acutely is with respect to the compiling of official planning statistics by the CSO. The CSO produces official planning statistics using data drawn from LAs' PAMS and ABP's PleanIT system. They send an Excel template to each LA and ABP seeking information on 14 variables related to planning applications for the previous month (for each application they request info such as reference number, permission type, address, decision, number of units, floor area). The first data friction relates to compiling data as the PAMS systems do not possess an automated reporting function that can produce the required data. A planner needs to manually open and extract the required information for feach planning application and enter it into the spreadsheet. The second data friction arises due to the variability in data capture across PAMS, meaning that the data recorded in the spreadsheets can possess different formats. The third data friction is caused by a number of LAs either ignoring the CSO template and using their own, or returning the data in a different media (e.g., as a pdf, screenshots, or printed paper tables). This results in a CSO staff member typically spending up to a month cleaning and wrangling the data to standardise them across LAs.

Socio-cultural data frictions generally relate to limits on resources and capacities due to austerity measures. In the Irish case, austerity in the post-2008 crash period was severe. The deep contraction of the economy led to a massive reduction in government revenue and spending. LAs' net

budgeted expenditure fell from 5.029 billion in 2008 to a low of 3.911 billion in 2015, a fall of 22.2% (DEHLG 2008, DECLG 2015). LA staffing fell from 35,007 in 2008 to a low of 26,630 in 2015, a fall of 23.9% (DPER 2024). Those still employed by LAs saw a sizable reduction in salary that undoubtedly had a demotivating effect on staff. LA staffing in Q4 2023 was 31,792, still 9.2% below 2008 numbers. In 2022, the Local Government Management Agency (LGMA) and DHLGH identified a need for 541 new posts in local authority planning departments, a 35% uplift on staffing numbers at the time, plus the 10% of already established but vacant posts that needed to be filled (DHLGH 2024). The DHLGH concluded that 'there are strong signals that the pool of professional planners in Ireland is undersized by a factor of 25–30%' (p. 11). Understaffing has led to fatigue, frustration, and demoralisation in planning departments, which has translated into practices of refusal or prioritisation, such as focusing on absolutely necessary and urgent operational functions. One expression of such tactics is staff varying in how much data they record for each application case, with few planners entering all relevant data and some recording the minimal viable amount (e.g., required fields), leading to patchiness and inconsistency of data capture across applications.

Despite these data frictions, it is important to note that at a base level the data ecosystem is nonetheless functional and does enable actors to fulfil their statutory role and deliver services. Planning applications are being processed, assessed and decisions made. Appeals are being lodged, investigated and adjudicated. Construction and compliance with building control measures is being tracked. At a higher level, however, the data ecosystem is less than optimal for performing tasks that extend beyond assessing and making decisions on applications and tracking building control compliance, such as repurposing the data held within the data systems for the compilation of official statistics and open datasets that would aid policy making. A core reason for this disjuncture is that the original articulation and scaffolding of APAS, iPlan, and Odyssey did not include the need to produce official statistics and open data. The ability to extract data via an ETL process for inclusion in NPAD was not anticipated in the design of the ePlan system. As we detail below, at the time of writing, a major re-organisation of the data ecosystem is being planned that would address many of the data frictions we have documented.

THE DEVELOPMENT OF A DATA ECOSYSTEM OVER TIME

The Irish planning data ecosystem has never had a masterplan with a clearly defined set of technical specifications, roles and responsibilities, workflows, governance and management structure, and standards and protocols. Instead, the data ecosystem has been jerry-rigged together over many years, with different data systems commissioned and adopted at different points by numerous, independent actors that have varying aims, agendas, and constraints, and who configured the systems to suit their specific needs (see Figure 21.6). In effect, a relatively slow process of digitalisation has been

underway since the 1990s and was still occurring at the time of writing. This digitalisation transition was slowed down by the 2008 financial crisis, with no major technical developments in the ecosystem between 2004 and 2015. In 2015, the LGMA launched eplanning .i e, a centralised portal to access ePlan services. In the same year, the two Cork LAs transferred from using iPlan to a new system, Odyssey, to manage their planning applications. In 2016, the BCMS was launched as a shared service, and PETaL and NPAD were introduced by the DHLGH. In 2017, ABP launched Plean-IT. In 2021, the PACE was launched, and in 2022 planning .localgov . ie, an online portal for the submission of planning applications and third-party public feedback about applications as webforms and pdf files, went live. As of August 2024, it was still only possible to apply for planning permission using a paper submission in four LAs.

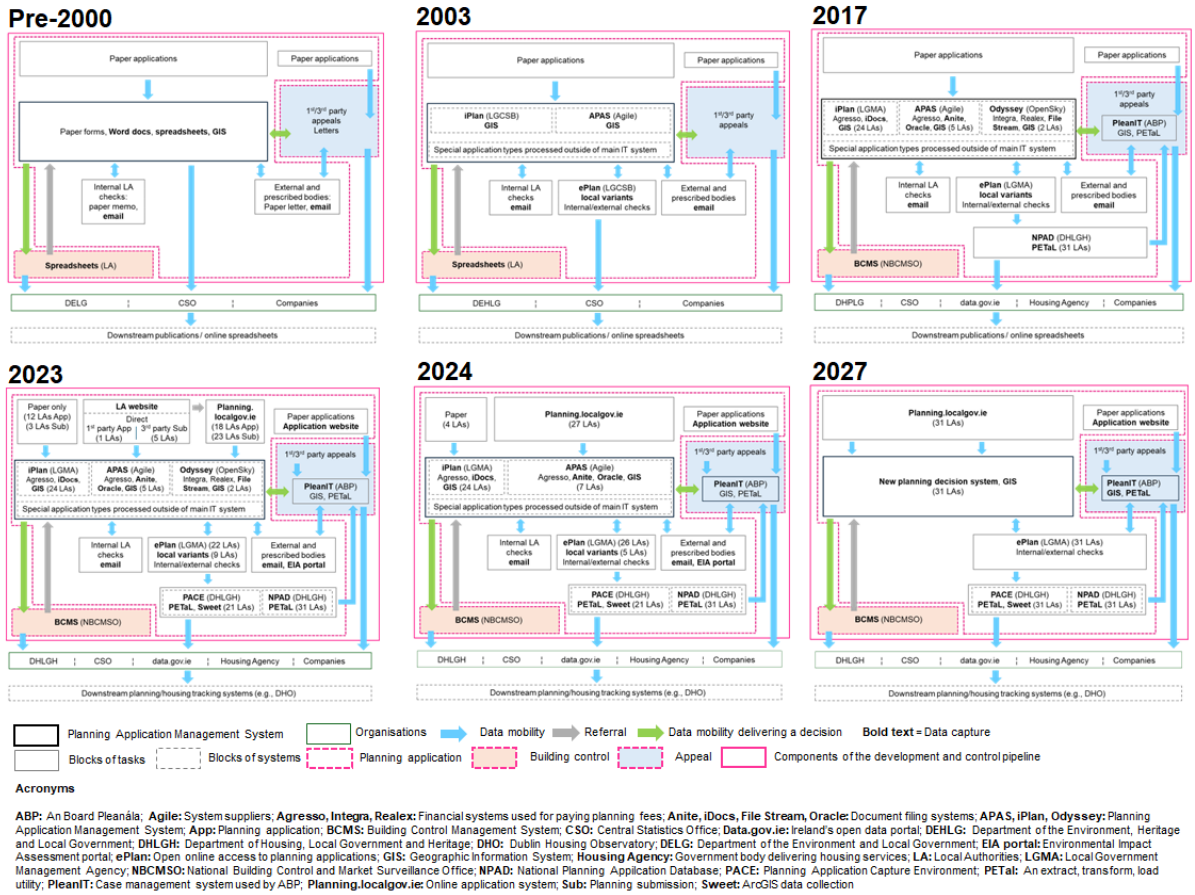

Figure 21.6 The digitalisation and development of a planning development and control data ecosystem over 25 years

Given this jerry-rigged construction over time, it is little wonder that multiple data frictions exist in the data ecosystem. The effects of these data frictions are well recognised by policy makers at the national level in the LGMA, the DHLGH, and the Department of the Taoiseach (Prime Minister's Office). As we write, there are three initiatives underway aimed at significantly reducing data frictions and to expand the expected functionality of systems. First, an inter-departmental group led by the

Department of the Taoiseach was conducting a review aimed at addressing the two primary weaknesses of the BCMS: the lack of shared ID reference tying the BCMS to PAMS; and the lack of standardisation and data quality due to open text fields and self-reporting. Second, the LGMA and DHLGH have been producing a plan to create a new, standardised national development and control system. While the detail of this plan is not yet published, if it were to progress to implementation it would see all 31 LAs using the same set of IT systems, configured in the same way, with standardised data ontologies, workflows, and no option to individually tweak, and from which it will be much easier to run bespoke reports and extract data (see Figure 21.6). Third, there is a recognition that the understaffing issue needs to be addressed by filling vacant posts and increasing the number of planners by 350–400 in the next 3–5 years (DHLGH 2024). The extent to which these three initiatives will lead to significant change is unknown as their adoption and implementation require agreement across ecosystem stakeholders and financial investment (requiring agreement by political coalition partners).

CONCLUSION

Bureaucratic work across state, business, and civil society has become increasingly performed using a constellation of digital technologies, such as operating systems and file storage, word processing, spreadsheets, email, video calls, web portals, management systems, and a range of specialist software (in the case of planning, software such as computer-aided design, geographic information systems, planning support systems, building information modelling, 3D spatial media (virtual reality, augmented reality), and participatory consultation platforms). Each data system constitutes a data assemblage, with the constellation of data assemblages forming a data ecosystem (an assemblage of data assemblages). Despite their centrality to the operations of bureaucracy, and to other data-dependent work, to date, relatively little research has been undertaken to chart the constitution and inter-dependencies of data ecosystems and to examine how they function.

In our view, there is a need for further research to investigate the nature and development of data ecosystems. In particular, there is a need for further case studies across sectors (state, business, civil society) and domains (education, health, welfare, innovation, climate action, etc.) to see whether there are different kinds of data ecosystems and what their characteristics are; to identify how effective data seams work, chart forms of data frictions and evaluate how to address them most effectively; and document how data ecosystems are formed and develop over time. In addition, there is a need to further consider how best to make sense of and theorise the nature and workings of data ecosystems. We have provided some thoughts, drawing on the literature and our case study, but we are very much near the beginning of this conceptual journey.

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NOTES

1. In June 2025 with the introduction of a new Planning and Development Act 2024, An Bord Pleanála's name was changed to An Coimisiún Pleanála. Despite the recent name change, in our text we use the acronym ABP to reference An Bord Pleanála as this was the official name during the time of writing.
2. The Department of Housing, Local Government and Heritage (DHLGH) has changed its name several times by means of statutory instruments. In our text and diagrams, we mention the Department of the Environment and Local Government (DELG) pre-2000, the Department of the Environment, Heritage and Local Government (DEHLG) in 2004, the Department of Housing, Planning and Local Government (DHPLG) in 2017 and the DHLGH for 2023 and 2024. All these acronyms represent the same authority over the years.
3. https://storymaps .arcgis .com /stories /ab1 2ed6 d50a 540e 2891 170c 24955ff49.

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