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Platform, or technology project? A spectrum of six strategic ‘plays’ from UK government IT initiatives and their implications for policy

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ABSTRACT

There is a markedly broad range of definitions and illustrative examples of the role played by governments themselves within the literature on government platforms. In response we conduct an inductive and deductive qualitative review of the literature to clarify this landscape and so to develop a typology of six definitions of government platforms, organised within three genres along a spectrum from fully centralised, through to fully decentralised. For each platform definition we offer illustrative ‘mini-cases’ drawn from the UK government experience as well as further insights and implications for each genre, drawn from the broader information systems literature on platforms. A range of benefits, risks, governance challenges, policy recommendations, and suggestions for further research are then identified and discussed.

1. Introduction

There is growing recognition that emerging, technology-enabled forms of organizing are starting to blur traditional boundaries between public, private, and third sectors (Christensen & Lægheid, 2007; Hall & Battaglio, 2018). Indeed, some have characterized the ‘new world’ as a ‘polycentric, multi-nodal, multi-sector, multi-level, multi-actor, multi-logic, multi-media, multi-practice place characterized by complexity, dynamism, uncertainty and ambiguity in which a wide range of actors are engaged in public value creation and do so in shifting configurations’ (Bryson, Sancino, Benington, & Sørensen, 2017, p. 64). As open flexible digital technologies have begun to move collaboration beyond organisational boundaries (see Chesbrough, 2003; Chesbrough, 2011; Pisano, 1990) so, within the public domain, notions such as ‘transformational government’ and ‘e-government’ (for further discussion see Bekkers, 2003; Irani, Love, & Montazemi, 2007; Moon, 2002), ‘e-participation’ (e.g. Sæbø, Rose, & Flak, 2008) and ‘open government’ (e.g. Hansson, Belkacem, & Ekenberg, 2015) have ushered in a focus on how information technology can be used to reconfigure public services around the citizen (King & Cotterill, 2007). This in turn, raises important questions about the changing balance between citizens, public administrations, and political authority itself (Maier-Rabler & Huber, 2011).

There is a growing diversity of conceptualisations about what the role of the state should be within this shifting environment (Prabhu, 2021)

and growing pressure on governments to understand and formulate coherent policy around the changing role of the state in public value creation (Mazzucato, 2018). These challenges are only increased with the emergence of digital platforms which we broadly define as *extensible software, hardware and associated organisational processes and standards* drawing on de Reuver, Sorensen, and Basole (2017).

Digital platforms, and the data processing associated with these, have required government to increasingly engage with the ‘cloud’ (Venters & Whitley, 2012) as they use corporate sector data-centres or build these themselves (as in the e-Estonia case (Kitsing, 2008; Margetts & Naumann, 2017)) for data processing, analytics and continuous processing capabilities (Caprotti & Liu, 2020). In addition, for process-heavy public administration, the ever-growing array of related cloud-based utilities and services offer significant potential value, particularly those of machine learning and process automation (Stone et al., 2016). In turn, the cloud computing sector is maturing its offerings to government. For example, Amazon Web Services’ (AWS) ‘Open Government Solutions’ website offers re-usable open capabilities, design patterns, code libraries, etc.¹ Thus, questions, and choices, about when and how to make best use of platform based digital capabilities and the respective roles of government and private sector in this process are arguably becoming more important than ever.

The academic literature shows that platforms encourage innovation, which in turn can prompt fundamental change to an organisation’s

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¹ <https://aws.amazon.com/government-education/government/open-government-solutions/>

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understanding of its purpose (de Reuver et al., 2017). Through their generativity (Tilson, Lyytinen, & Sørensen, 2010), that is that they might be “innovated upon” (Gawer & Cusumano, 2002), platforms can open new forms of market innovation (Eisenmann, Parker, & Alstyne, 2006). There is no reason, in principle, why governments should be any different. Yet, harnessing the potential of digital platforms to deliver public services that benefit from similar scale, velocity, innovation, and investment has proven challenging and created considerable misunderstanding and inconsistency (Brown, Fishenden, Thompson, & Venters, 2017). While literature has emerged using terms such as “Government as a Platform” (Myeong & Seo, 2020; O’Reilly, 2011), and while oft-cited exemplars exist such as Estonia’s e-government systems (Kitsing, 2008; Margetts & Naumann, 2017) confusion remains as to what ‘platforms’ are when associated with government, and about the different roles that might be available to government in harnessing this phenomenon for public benefit.

Indeed, when discussing ‘platforms’, it is very often unclear just what policymakers are talking about: a simple technology/software project, or a collaborative distributed form of social value creation? The failure of governments to be clearer about the ‘platform discussion’ can result, we contend, in naïve or relatively underperforming platform initiatives, despite attracting, for example, £1.8Bn of direct investment in the UK alone (Brown et al., 2017). Indeed even O’Reilly acknowledges that his term “Government as a Platform ... applies to every aspect of the government’s role in society”, citing interstate highway building as an example of government platform thinking (O’Reilly, 2011, p15) – something that is perhaps not helpful for academic debate.

It is therefore clear that there is a lack of definitional clarity concerning the term ‘platform’ in the context of Government IT – and relatedly, about the choices that are available to government, and the roles it can play. Consequentially different studies use the term platform in subtly (and sometimes unsubtly) different ways, inhibiting policy makers and researchers from effectively comparing and contrasting public sector platform initiatives. While different perspectives on platforms are valid and indeed desirable, we are motivated to develop a taxonomy of these differences, and associated roles, that allows comparisons between them, in order to better inform governments about the choices that they face. To address this lack of definitional clarity we therefore seek to sharpen and deepen our understanding of platforms through addressing a research question of “*What different models are encompassed by the term ‘platform’ in the context of government IT, and what are the associated roles played by government within each?*”. We address this question through a taxonomic perspective in which we (i) review the extant literature on platforms within government, which we find to contain a surprising breadth of understandings regarding what a platform ‘is’, as well as about the respective roles of government versus other actors in bringing these about. We identify a spectrum of genres evident within the Government IT literature ranging from (a) Government as the builder/commissioner of technology it calls ‘platforms’, through (b) Government as a neutral catalyst and arbitrator; to (c) Government as a decentralised partner. This spectrum broadly reflects the level of government control over the platform, and in return the generativity that is likely evident within the platform. We then (ii) illustrate and sharpen our definitions of these genres using a review of the government IT grey literature in the UK, and (iii) address some of the policy and practical questions thus raised with a review of the broader literature from information systems and management.

We draw upon our analysis to partition our spectrum into six distinct definitions of platforms within government (three genres, each containing two definitions). Each definition is evidenced by a minicase from the UK and discussed in terms of benefits, risks and policy recommendations (introduced in Table 1, elaborated in Table 2). The contribution of the paper is this typology of six platform definitions evident in the public sector which offers a more granular understanding of the phenomenon, and the associated research and policy recommendations.

Table 1
Summary of the typology

Government as Platform Builder:
Definition 1) Platform from Government: A government led integration project harnessing cloud-based services to build a platform and drive engagement with the platform within other organisations.
Definition 2) Government led Platform: Government undertakes architectural work to identify common capabilities, but remains open to a mix of possible delivery models.
Government as Platform Catalyst & Arbitrator:
Definition 3) Market led Government Platform: Government outsources risk of building platform marketplace to the market. Periodically opened to generative innovation through regular re-tendering.
Definition 4) Government Standardised Platform: Government creates an ecosystem in an open way, promoting others to harness standardised capabilities.
Government as Decentralised Partner:
Definition 5) Government as Data Source Platform: Government assumes role of platform providing data in an open fashion to a marketplace. Government assumes little / no risk. Platform is open in access and usage.
Definition 6) Government Platform Ecosystem: The market creates a government ecosystem with the benefits accrued across the ecosystem, promoting the harnessing of standardised capabilities. This is a purely open play, with benefit accrued by all.

The paper is organised as follows. First, we outline our research approach. We then break the paper into three sections for each of the spectrum genres (*Government as Builder*, *Government as Catalyst*, *Government as Partner*). Within each section we first present the government IT literature evidencing the spectrum, then present our grey-literature cases, ending with a discussion that brings these together with the wider Information Systems and Management literatures on platforms to develop practical insights for policy and further research recommendations. The paper then concludes with an overall table (Table 2) and discussion of the typology, conclusions and overarching recommendations.

1.1. Research approach

Our research goal was to develop a typology (Table 2) showing different genres of government platforms, and the associated roles that government can play in each. To build our typology, we start, first, by reviewing the government IT literature from which we derive our genres. We sought to identify a comprehensive corpus of platform papers within the Government IT literature and Information Systems literature. We identified a basket of relevant journals²: Government Information Quarterly, JPART, Public Administration Review, Information Policy: The International Journal of Government & Democracy in the Information Age; Public Administration; Electronic Government, International Journal; Public Management Review; Transforming Government: People, Process and Policy; Public Performance & Management Review; The American Review of Public Administration; Big Data & Society; and Technological Forecasting and Social Change. Having identified our basket, we used ProQuest to undertake a complete literature search of this basket of journals, seeking articles after 2015 with the term “platform” in title or abstract. This led us to a corpus of 168 relevant articles. Finally, we interpretively reviewed each article rejecting 100 as of limited relevance and preparing summaries and topic analysis of the remaining 68 articles. We moved iteratively and inductively between

² To produce this basket of Government IT journals we started with PAR, JPART and GIQ as the highest ABS ranking journals in this area (GIQ in ABS-Information Management and PAR and JPART in ABS-Public Sector and Healthcare). Using ProQuest we selected from these journals all papers from 2015 to 2020 with “Platform” in the title or abstract and then analysed these papers’ references to identify articles they cited on government technology issues frequently cited from other journals. From this analysis we arrived at the basket of journals on Government IT that research platforms.

summaries discussing the breadth of platform definitions and their suggested involvement of government (Ridley, 2012). Writing and rewriting was an interpretive act of synthesis and structuring from which the typology emerged with the aim of defining platforms in government – led by a desire for construct clarity (Suddaby, 2010) that brought the concept of “platforms” in government policy into sharp distinction.

Second, mindful of the need to ground, deepen, exemplify and critically engage with our typology we identified different mini-cases from within UK government IT which exemplified the emerging definitions. The aim of these mini-cases was to sharpen, deepen and extend the critical analysis of the existing literature by comparison with cases (Boell & Cecez-Kecmanovic, 2015) in the context of the overall literature review aims (Ridley, 2012). The cases were identified by our immersion in the UK public sector IT debates (e.g. through roles on committees and involvement in projects) and through access to a consulting practices’ systematic horizon scanning reports on UK government IT projects. A broad grey literature (e.g. newspapers, blogs, official reports) were used interpretively (Walsham, 1995; Walsham, 2006) within our review. Each mini-case is briefly described and used to illustrate government involvement in the platform (Alpi & Evans, 2019). In order to bring rigour to this subjective interpretive process the second author adopted the position of a critical researcher, providing a form of triangulation of investigators (Pettigrew, 1990). All the cases were selected for being well reported in the media.

Third, each of the mini-cases raised further questions about practical implementation, prompting us to turn to the broader information systems literature to develop practical insights and associated policy recommendations about how each genre may be effectively deployed within government. Accordingly, we undertook a review of the Information Systems (IS) literature on platforms. Following Henfridsson and Bygstad (2013) we selected the Association of Information Systems basket of eight top IS journals (MISQ, JIT, ISJ, JSIS, EJIS, ISR, JMIS, JAIS), adding four additional journals addressing digital platforms (I & O, ITP, Information Society, CSCW). We used ProQuest to select articles since 2015 which included “platform” within their title or abstract. Highly cited earlier articles and relevant books and conference papers were also reviewed on an ad-hoc basis. Throughout, our aim was not a systematic review but rather a traditional narrative review (Boell & Cecez-Kecmanovic, 2015) focused on meaning-making (Golden-Biddle & Locke, 1997) rather than seeking comprehensive understanding and critical assessment. We achieve this through dialogical interaction between the researchers’ knowledge and the literature (Mills, 2000) from which categories and summaries of earlier work emerge following in-depth sensitive reading and classification (cf. Leonardi & Barley, 2010).

Our research approach is summarised in Fig. 1 below:

2. Platform: the spectrum of perspectives

2.1. Government as platform builder

Our literature analysis revealed a rich depth and breadth of valuable lessons concerning many aspects of the design, build, delivery, and use of ‘platforms’, yet a curious range of positions upon what we came to understand to be a broad spectrum of ideas about the actual role of platforms in government, and vice versa. Many of these discussions centred on aspiring to build what O’Reilly termed “Government as a Platform” (GaaP) by transforming the structure of government into “an open platform that allows people inside and outside government to innovate and evolve the outcomes through interactions between government and its citizens” (O’Reilly, 2010). Unfortunately, as Myeong and Seo (2020) recently noted, until recently the ICT infrastructure required for GaaP ideas was insufficiently developed, leading governments to develop computing architectures they themselves orchestrate and commission, or build, themselves. As such, at the more traditional extreme of our spectrum, authors viewed *government as platform*

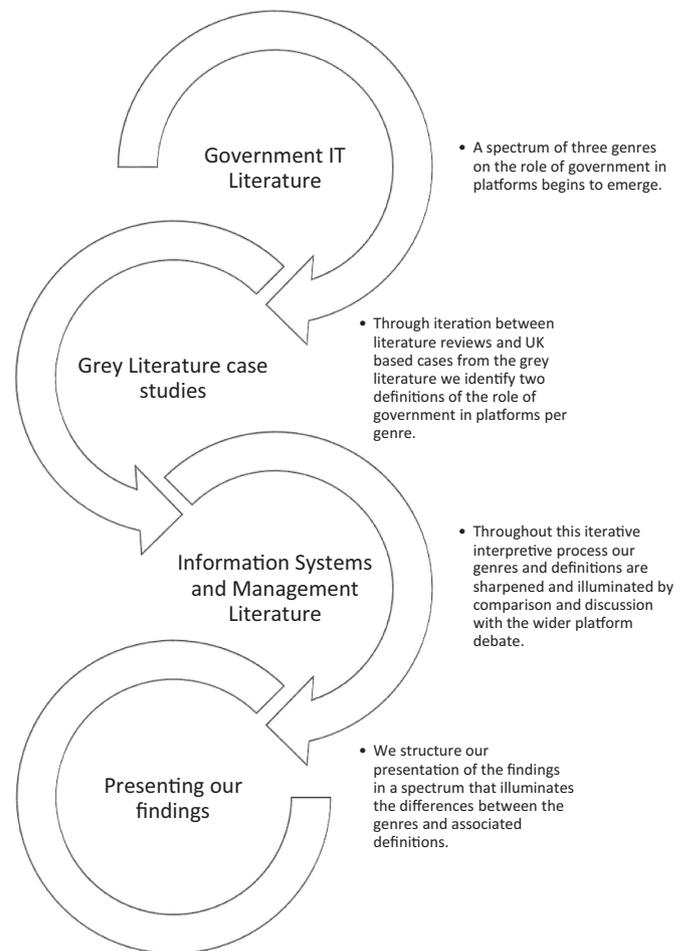


Fig. 1. Research approach.

builder in a sense that ‘platform’ is broadly interchangeable with ‘technology application’, or project.

For example, Timeus, Vinaixa, and Pardo-Bosch (2020)’s useful description of the elements that city councils should consider during the design, delivery and assessment of smart services is applied to the development of an ‘ICT platform’ by Bristol Council that is largely consistent with the government being a builder of technology. Similarly, Biljohn and Lues (2019)’s description of social innovation in South African local government emphasises the importance of citizen engagement during the (government’s) planning, design, and delivery of collaborative services described as ‘platforms for citizen participation’ (see also Liu, 2017; Madsen & Munk, 2019). Indeed, emphasis on the central importance of ‘taking public engagement seriously’ in technology constructed by government is evident from many authors (e.g. Gerpott & Ahmadi, 2016; Greenway, Terrett, Bracken, & Loosemore, 2018; Kaminis & Tsiouras, 2015; Liu, 2017; Luna-Reyes, 2017; No, Mook, & Schugurensky, 2017; Raford, 2015).

To these arguably relatively simple notions of government ‘platform-as-technology’ can be added those studies that subscribe broadly to this platform definition, but which explicitly consider platforms’ ability to start to support new social delivery models. For example, Stefanou and Skouras (2015) describe the need to consider the re-organisation of government functions and procedures along e-government lines as part of the implementation of a new payroll system hosted on a “cloud computing platform” – although the ‘platform’ itself is not accorded much focal interest. Similarly, Kapoor, Omar, and Sivarajah (2017) study of the design, evaluation and public rollout of “an advanced ICT platform for participatory budgeting” (ibid. p. 66) considers the platform’s ability to support progressive integration of budgeting practices

across different institutional contexts, although the ‘platform’ itself conforms to the idea of a piece of commonly-consumed software; a similar conception of ‘platform’ underpins Yang and Torneo (2016) study of a central “integrated public service evaluation system” underpinning all performance evaluations in South Korea. Another example is that of e-Estonia (Kitsing, 2008; Margetts & Naumann, 2017)) in which the government sought to develop a secure data-exchange backbone for government (x-Road) for its own purposes, expanding this platform to include support for telecoms and banks – though the bulk of the technical system was hosted by the government-as-builder.³

Whilst these examples appear closer to a model of (technology) ‘platform for government’ (Brown et al., 2017) than ‘government as a platform’, we can see some examples of government-as-builder/licenser-of-technology that start to shift towards identifying a new role for government. For example, Mergel (2018) studies the increased use of online open innovation platforms such as Challenge.gov. Although the notion of ‘platform’ here is still significantly technology-based, there is, within this work, an equal emphasis on the idea of ‘platform’ as a foundation for distributed co-production that drives increased innovation and inclusivity. Such an emphasis is visible in Sancino and Hudson (2020)’s multi-actor theory of public value co-creation, supported by smart cities as a platform for open innovation. Within the UK we observed examples of projects which fit within this Government-as-builder/commissioner of technology mode, in which the government remained focused on building technology, albeit platform-based technology, for its own use.

2.2. Platform from government: government undertakes a platform-as-technology focused integration project in which cloud-based services are integrated to provide an internal platform for innovation with the intention to drive engagement with this platform within other organisations

In ‘platform from government’, government identifies specific requirements that currently do not exist within pre-existing services available in the commercial cloud-enabled platform marketplace. Rather than build these from the ground up, however, wherever possible, it seeks to configure existing capabilities from within the cloud marketplace, then offer these as a vibrant ecosystem of supporting capabilities and services. For instance, Adur and Worthing, a small local government organisation on the UK south coast (Jones, Thompson, & Venters, 2021) identified core capabilities, such as online booking, notifications, performance management, inspection assessments, payments, SLA management and customer self-service, etc. as key to local government work. Since these could not be provided effectively using pre-existing platforms, Adur and Worthing used the Salesforce platform, configuring these core local-government capabilities using a low-code development platform called MatsSoft. This resulted in entirely cloud-based, local government capabilities which could be consumed by any local government organisation, albeit with minor configuration. Indeed, it is Adur and Worthing’s intent to commoditise these functions further by persuading many local service providers to use them, so improving data sharing and innovation, and saving money. An example of this commoditisation was the ability to create an award-winning “social-prescribing” service prototype⁴ on the platform that “connects individuals to a whole host of voluntary, statutory, and private services”⁵ created and run from an organisation external to the local government of Adur and Worthing. At time of writing however, there had been limited take-up of the platform from other councils.

A notorious, and arguably less successful, second example in the UK is the Government Digital Service’s (GDS) Verify platform for identity

management across the UK public sector. On 5 March 2019 the UK National Audit Office (NAO) published *Investigation into Verify*,⁶ the latest of a series of external assessments of this flagship platform programme. With considerably lower than expected take-up by government departments, and having achieved £217million of its projected £873 million benefits (figures criticised by NAO), its future remains uncertain.

These examples appear to illustrate the inherent risks of a *Platform from Government* initiative in driving traffic to the platform. In particular, there is a lack of incentives encouraging widespread adoption by public service providers of the centrally provided service. The implication may be that government should take more seriously cultural efforts to anticipate and overcome organisational inertia. To do this it should harness vigorous communication efforts and incentive arrangements, such as those employed by platform-based organisations in the private sector. However, such an approach may be counter-cultural, and thus difficult to achieve, within public sector organisations.

2.3. Government-led platform: Government undertakes architectural work to identify common capabilities, but remains open to a mix of possible delivery models

Our second Government-as-Platform-Builder case type, which we label ‘government-led platform’, exemplifies explicit attempts by government to identify and then curate potential commonality within currently duplicated and siloed capability across the public domain. Such curation then enables the use of a pragmatic mix of public and private sector development capability to address these common needs. Whilst GDS’ own Common Technology Services programme stalled in 2017,⁷ a more sharply-defined initiative has been outlined for Scotland, where the Digital Ecosystem Unit of the Scottish Government (DEU):

“...is taking a new approach. Instead of focusing on differences and organisational boundaries, we are asking:

- What things do public sector organisations do (or have) in common?
- Can we create and share standardised practical solutions for delivering these?
- In particular, can we find digital solutions to these things, and design them where appropriate, once for re-use by different organisations?”

(<https://cdn.evbus.com/eventlogos/93720189/sgdigitalecosystemworkshop0.1-1.docx>).

As an example of this approach, the Scottish Government conducted a ‘Discovery’ exercise⁸ in 2017 to identify the ‘shared service pattern’, and component capabilities, underlying the common (but currently balkanised and duplicated) process of applying for a licence for various government services. The Discovery revealed that most licence applications follow the same five steps: *Discovery* ‘do I require a licence to do this?’; *Routing* ‘which licences are required for what, and where do I apply?’; *Eligibility* ‘do I meet the right criteria?’; *Suitability* ‘does the government agree that I meet the right criteria?’; and *Issuing* of the licence. In turn, underlying this common service pattern are potentially common capabilities (for example, book appointment, take payment, validate benefits, issue proof, sign a document, etc). The Scottish Government envisages a progressive identification of common service patterns over time, supported with underlying shared capabilities: this is set

⁶ <https://www.nao.org.uk/wp-content/uploads/2019/03/Investigation-int-o-verify.pdf>

⁷ https://www.theregister.co.uk/2017/05/12/head_of_common_technology_services_iain_patterson_steps_down/

⁸ Consulting assignment for Scottish Government undertaken in 2017 by Methods (removed for review), a professional services organisation partially owned by one of the authors.

³ www.ria.ee

⁴ <https://www.adur-worthing.gov.uk/community-wellbeing/going-local/>

⁵ Joint Strategic Committee report on Going Local by Adur and Worthing council 2018.

out in the 'Realising Scotland's full potential in a digital world' plan⁹ and also in the 'Digital Scotland service standard'¹⁰ which states the expectation to "use and contribute to shared digital practices, processes, components, standards, patterns and platforms".

In another example, Shared Resource Service Wales (SRS) is seeking to achieve a commoditisation of common functions: its website contains the declaration that "the vision for SRS is to use a single technology platform to consolidate demand and broker supply of all types of resources to Public Service Wales".¹¹

These examples are at an early stage and it is too soon to comment on their effectiveness. It is however worth noting that, within them, the growing aspiration to evolve a service-oriented architecture comprising genuine interoperability between interchangeable components is accompanied by a concern to support the diverse needs of so-called 'edge cases': those citizens whose profiles do not fit with some of the standardised, 'vanilla' approaches being proposed. It remains to be seen whether the architectural aspiration of interoperability and service-orientation can be matched with the ongoing commitment to diversity needed for public services whose customers often lack an alternative.

2.3.1. Discussion of government as platform builder

Placing these *Platform from Government* and *Government led Platform* initiatives in the context of the broader IS/IT literature, they resemble more traditional technology projects, in that government retains a much closer involvement in architecting and possibly building the platform; the platform is modular in structure, and yet the organisational form remains predominantly centralised, and the market dynamic that characterises commercial platforms is largely absent (at least initially). As firmly government-driven initiatives, this model may struggle to harness the emergent practices of a large number of complementary developers (Eaton, Elaluf-Calderwood, Sørensen, & Yoo, 2015) innovating upon the platform. Similarly, as commercial marketplace involvement is largely absent, the costs/risk for development, driving take-up/building trust, and upgrade are retained by government itself. The recent difficulties with the England's COVID-19 track and trace app, developed/commissioned by government using a centralised model in isolation from open standards released by Apple and Google and effectively shelved in June 2020,¹² illustrate such issues. These are essentially examples of in-firm platform construction (Gawer, 2011; Gawer & Cusumano, 2002) which more closely resemble standardisation of digital infrastructures.

Rather than considering platforms as two-sided economic marketplaces (Evans & Schmalensee, 2016; Parker & Van Alstyne, 2005), such *Government as Builder* platforms are more organisational - a form of meta-organisation that provides a formative context that lies in readiness for the specific contextual needs to which it might be applied. Once constructed the platform provides capabilities that might be improvised, bricolaged and tinkered with to meet the contingent needs of the time (Ciborra, 2002), but this improvisation is undertaken by the platform constructor (the government) based on their specific needs rather than a diaspora of outsider complementors that the platform constructor is seeking to please (e.g. as Apple needs to support its App developers (Eaton et al., 2015)). Research is thus needed on how government can, in the process of designing platforms, ensure capabilities are generically useful (to allow the future opening-up of the platform) rather than contingent on specific locally situated need. These cases also illustrate the need for government to be prepared to go beyond market-based

platform approaches where appropriate to ensure edge-case needs are catered for.

Underpinning *Government as Builder*, is an assumption of achieving architectural alignment (Bygstad & Øvrelid, 2020) by loosely coupling specific processes from the underlying infrastructure and so avoiding needless duplication of non-value-adding activity across government. Our examples, however, show limited take-up of both Adur and Worthing's platform and GDS' Verify services, sluggish adoption of common components in Scotland, and limited adoption of SRS' "single technology platform" to power local services across Wales. This suggests that the inherently siloed structure of the public sector may mitigate against this benefit.

Within the UK, for example, there are 400+ local government organisations, 43 police forces, and numerous community functions (housing, social care, third sector). Most of these have siloed IT systems (often built prior to internet or when cloud was in an early stage of maturity and not standardised) they would like to replace with easily available cloud services. However, unless these organisations are tightly controlled by central government such that they consume standardised functions (e.g. they all undertake licencing, payments, case management in the same way using the same services), and central government promotes interoperability, we may see a proliferation of platform-based-services within these siloed institutions, each with low take-up by others.

This is not to claim that *Government as Platform Builder* initiatives may not deliver valuably at local level: for example, Adur and Worthing council attributes to its platform approach its recent delivery of a mutual aid app to its local community within a record 48 h in response to the COVID-19 pandemic.¹³ There is also increasing consensus about the ability of digital cloud platforms, where effectively deployed, to offer flexibility, configurability, and cost savings (de Reuver et al., 2017; Venters & Whitley, 2012). Rather we argue that widespread efficiencies resulting from others' take-up of its technology investments may require further research to understand how to overcome localised inertia (Brown et al., 2017), perhaps through policy decisions in central government. At a collective level, many disconnected examples of *Platform from Government*, in particular, run the risk of simply adding platform technology to an existing, already highly complex, legacy and failing to offer the separate modular components that can be recombined through the mixing and matching of components (Schilling, 2000). In summary, we may move from siloed IT systems within each public organisation, to siloed cloud-based platforms for government within each public organisation.

Research shows that political motivation, regional changes and emphasis on local tailoring inhibit standardisation, and thus enforcing standards across multiple local organisations itself produces disorder and additional work for other users (Ellingsen & Monteiro, 2006). Indeed the perennial problem of achieving local specificity while seeking standardised universality (Timmermans & Berg, 1997) remains a central challenge of this type of platform approach (Tiwana & Konsynski, 2010). Given the challenges of standardisation and the ease of construction (through cloud services) we, perhaps unsurprisingly, see the emergence of replications in government-as-builder/commissioner. Take identity management in the UK alone:

"A range of public and private sector identity implementations [exist]— including NHS Login, HMRC's updated Government Gateway and identity verification platform, the Home Office's EU Settled Status programme, the DWP Dynamic Trust Hub, GOV.UK Verify and the Scottish Government's Digital Identity Scotland in the UK public sector; and Open Banking together with a range of personal identity apps running on smartphones in the private sector; the

⁹ <https://www.gov.scot/publications/realising-scotlands-full-potential-digital-world-digital-strategy-scotland/>

¹⁰ <https://resources.mygov.scot/alpha/service-standard/digital-scotland-service-standard/>

¹¹ <https://www.whatdotheyknow.com/request/340557/response/829262/attach/2/SRS014%20SRS%20Strategy%202016%202020.pdf>

¹² <https://www.theguardian.com/world/2020/jun/18/piloted-in-may-ditch-ed-in-june-the-failure-of-englands-covid-19-app>

¹³ <https://www.youtube.com/watch?v=aUmQwwLq01k>

ability of smartphones to read ePassport chips and international initiatives such as ‘sign in with Apple’ – now typify the landscape. The Document Checking Service (DCS) pilot, opening up the ability for trusted organisations to check digitally whether British passports are valid beyond the former GOV/UK Verify commercial companies, is also a notable development” (Fishenden, 2020, p.45).

The proliferation of platform-based technology solutions could therefore risk reinforcing existing silos in public service delivery. When viewed primarily as technology, ‘platform’ solutions in themselves also do not challenge traditional delivery models: for example, the SRS platform (*Government led Platform*) did not challenge the existence of councils themselves as the efficient providers of local services for Wales, any more than Bristol City Council’s ‘ICT platform’ (Timeus et al., 2020) or the local services in South Africa described by Biljohn and Lues (2019). Those engaging in Government-as-builder/commissioner interventions should therefore remain particularly mindful not only of ‘re-inventing the wheel’ but also of not compounding or ossifying existing potential inefficiencies of the legacy structures of government (e.g. procurement, skills-acquisition, systems maintenance, local re-organisations, inability to share best practice, etc); Yang and Torneo (2016)’s discussion of a single performance evaluation platform across South Korean government is an example of an initiative that explicitly seeks to avoid this outcome.

Further research should examine how to avoid inhibiting data-sharing from which other, more open, platforms might emerge – pointing to the importance of common (open) standards. Research should also examine the rigidity of *Platforms from Government* and *Government led Platforms* such that government is not inhibited from further joined up or collective platform developments in the future. Finally, research should examine how transparency might be achieved such that siloed government agencies are aware of the possibilities of sharing capabilities from others’ platforms from government – thus avoiding ossifying existing silos.

3. Government as platform catalyst and arbitrator

Beyond descriptions of *Government as Builder* we noted studies that examine the often-subtle interaction between the state and private/third sectors in flexible consortia that come together around a specific goal but may face governance and associated trust issues that require *Government as Platform Catalyst & Arbitrator*, at the centre of our spectrum of government platforms. Schwabe (2019) highlights how some administrations are engaging in such ‘data driven social partnerships’ to jointly create value. In such cases, government, through public agencies, can play key catalysing roles in bringing about such consortia: as supplier of data, source of trust, guarantor of data quality, user of data, and incentive for making goods public. Yet, in contrast to *Government as Platform Builder*, the role of government as directly building technology is diminished. As illustrated by Schwabe, a good example is the use of blockchain (technology) platforms that support entirely, sometimes radically, new organisational forms that more closely resemble de Reuver et al. (2017)’s definition of platforms as extensible software, hardware and associated organisational processes and standards.

Some of the most interesting examples of such government-related distributed consortia are emerging from China through ‘smart urbanism’: finely tuned alliances between regional authorities and local industry that blend a policy focus with digital data and services. Such ‘smart urbanism’ is producing powerful examples of hybrid platform organisations that are ushering in a new civic and social reality. For example, Caprotti and Liu (2020) discuss the Hangzhou CityBrain (Ansell & Miura, 2020), developed by Alibaba and based on a cloud computing architecture, as an emerging model where corporates process and analyse data, but government retains ownership and regulation of such data. This in turn, highlights the highly ‘glocal’ nature of platforms within urbanism (Dameri, Benevolo, Veglianti, & Li, 2019). Caprotti and Liu categorise different types of platforms within this context: advertising platforms

such as WeChat and Soso; commercial platforms such as JD and Taobao; sharing platforms such as Didi Chongzong or Meituan; governance platforms such as Citibrain (see above), and payment platforms such as Alipay or WeChat-Pay. All of these are examples of a hybrid *social*, as well as technical, organisation that the authors argue could be reshaping the experience of Chinese urban citizenship itself; indeed, it seems that either government or private/third sector operators are able to initiate such hybrid organisations (Yu, Wen, Jin, & Zhang, 2019). These approaches are similar to those referred to as “Government as a platform” (O’Reilly, 2010, 2011) or “platform government” (Myeong & Seo, 2020) in which the complexity of the public sector is reduced and innovation stimulated by the government mobilising its stakeholders through building digital platforms (Janssen & Estevez, 2013).

Moving further out still, there are increasing examples of government explicitly acknowledging the value of building intermediaries, as facilitators and enablers, who are actively assisting private and third sector actors to exploit open data in potentially innovative ways that it is not itself able to encompass (da Silva Craveiro & Albano, 2017). Such intermediaries may even be other government departments, who may need to be enlisted collaboratively to avoid top-down open data platform implementations that do not effectively engage citizens (Young, 2020). See also Zuiderwijk and Janssen (2014) regarding Open data challenges for governments.

Within the UK we noted two examples of *Government as Platform Catalyst & Arbitrator*: the first in which the government outsources the risk of building a two-sided marketplace, the second in which multiple local governments identify shared capabilities they all require but are currently duplicating multiple times at high cost.

3.1. Market-led government platform: government outsources risk of building platform marketplace to the market. Periodically opened to generative innovation through regular re-tendering

In our first variant, the ‘market-led government platform’, government outsources the risk of building a two-sided marketplace to the market, largely consuming existing technology to underpin the new business model. NHS jobs¹⁴ provides online recruitment services for the NHS and, with savings of £1bn since 2003, is the UK Government’s largest and, it has been argued, most successful example of a two-sided market based on a mass-subscription shared service. These savings were achieved through transforming 600 duplicate recruitment operations into a single extremely cheap platform to the NHS, which configured the pre-existing recruitment capabilities of internet-based job-board Jobsite (Thompson, 2015).

Since re-tendering in 2012 the basic service has been provided at close to cost, and was intended to be funded through additional innovation services provided to NHS applicants and employers. In tendering, the present supplier also proposed to innovate by processing criminal record checks through integration with the Criminal Records Bureau (CRB), reducing this, they argued, from weeks to days and reducing the cost by two thirds. It seems however that incentives did not align – the supplier was strongly incentivised (implementing the new service represented the bulk of their profit margin), but it proved difficult to engage the CRB in such a disruptive exercise. In July 2020, the Department of Health (overseeing NHS jobs) conducted a traditional procurement for rebuilding NHS Jobs from scratch based on a contract for supply, forgoing this potential funding model.

Similarly, in 2018, HM Land Registry conducted an architectural ‘Discovery’ around the potential use of the blockchain platform Corda.net to disrupt the current conveyancing market around selling and purchasing property in the UK.¹⁵ Like the NHS Jobs example, government

¹⁴ www.jobs.nhs.uk

¹⁵ <https://www.gov.uk/government/news/hm-land-registry-to-explore-the-benefits-of-blockchain>

acted as the catalyst and source of trust/governance, but unlike NHS Jobs its role stopped short at the Discovery stage, after it had demonstrated ‘the art of the possible’; commercial organisations have since launched start-ups around the proven concept with the intention of taking this further.

We derive two key observations from these two examples. The first is that, in successfully transferring the risk of driving traffic onto the new platform to its supplier base (NHS Jobs), or ‘pump-priming’ subsequent innovation by the market (HM Land Registry), government appears to have played a role of ‘social entrepreneur’, with genuinely transformative results/possibilities for the business and operating models in each sector (rather than rewarding the marketplace for building technology). The second observation is that, although apparently successful in this case, a market-led-government-platform may be unlikely to work across smaller sectors in government where there may be less potential cross-siloed demand for a common service. In such cases there is less incentive for an external supplier to undertake the risk of funding the underlying platform in the hope of reaping the rewards from provision of additional services across the platform (such as CRB in the case of NHS Jobs, or perhaps property surveys, in the case of HM Land Registry).

3.2. Government-standardised platform: government creates an ecosystem in an open way, promoting others to harness standardised capabilities

In our second variant, ‘government-standardised platform’, local government innovators start to identify capabilities that all of them require, but which at present they are duplicating many times. For example, the Jadu Library model (see also ‘Government Platform Ecosystem’ below) has been subsequently taken up by government in Pipeline,¹⁶ a collaboration platform curated by local government leaders group Local-GovDigital,¹⁷ and endorsed by local government minister Rishi Sunak in the Local Government Digital Declaration of July 2018.¹⁸ The objective is like that of the Jadu Library: the explicit sharing and commoditisation of key components of the local government operating model, with associated benefits for sharing data, joining-up services around citizens, and cost savings.

Similar to *Platform From Government*, it remains to be seen whether the cultural willingness to standardise and share common capabilities and data can be successfully engendered within organisations for whom this remains a new, and potentially risky, way of working in comparison to the certainties of dependency on single suppliers (even if they were inefficient and expensive). Noting that departmentally-led digital initiatives tend to be more successful when politically endorsed by a minister (Fishenden & Thompson, 2013), it is yet unclear whether such political backing exists within the local government sector. A potential ‘platform-building’ role is thus required centrally to encourage the cultural shift that may be required for such initiatives to have lasting effect.

3.3. Discussion of government as platform catalyst & arbitrator

Drawing on the IS/IT platforms literature to illuminate our discussion of *Market-led Government Platform* and *Government-Standardised Platform* variants, we identify a genre in which government seeks to balance its desire for control (through for example tight contractual relationships or domination of the requirement setting), with its desire to harness the potential cost-savings and innovation of more open models involving distributed co-production, such as those discussed by Mergel (2017) and Sancino and Hudson (2020). This central ground

where government acts as supplier of data, source of trust, and provides governance may also be hard to navigate. It is exemplified in detail by our NHS Jobs and HM Land Registry cases, and by Schwabe’s (2019) discussion of blockchain consortia. Specifically, there is a need to balance the paradoxical positions of supporting innovation and generativity, whilst also retaining overall control (Eaton et al., 2015; Tilson et al., 2010) as the platform seeks to drive take-up and use.

Without an understanding of the broader market dynamics and even the business/commercial model surrounding the proposed platform, the literature on commercial platforms suggests that such initiatives may struggle (Hanseth & Lyytinen, 2010; Nielsen & Aanestad, 2006; Wage-laar & Van Der Straeten, 2007) as other competitor platforms emerge. For example, NHS Jobs faces competition from platforms like LinkedIn, while Pipeline faces competition from other platform companies (e.g. AWS, Azure and Salesforce). For such companies, economies of scale and R&D budgets are larger than for the UK government and they may be considerably more willing to subsidise their platforms (in the short to medium term) to inhibit the success of government-co-ordinated platforms, where the commercial benefits and data accrue in the public, not private, domain and over the long-term rather than the politically-demanded short-term.

Maintaining trust in these more arms-length initiatives is also vital (Holmqvist & Pessi, 2006; Levina & Arriaga, 2014) as is the balancing of incentives and governance mechanisms (Markus & Bui, 2012; Xu & Zhang, 2013) that was perhaps an issue with the renewal of NHS Jobs. Such governance must be a balance between traditional outsourcing (with contracts and oversight) and more open approaches evidenced in the final of our genres, and with privacy and security concerns of all stakeholders. Achieving this is also difficult as it requires collective action and coordination from the neutral arbitrator (i.e. the lead government agency) against a background of public and private stakeholders who are invested in the status-quo and have different incentives. Further research into governments role in balancing closed contracting with open approaches is required.

Our examples of NHS Jobs, HM Land Registry, and Pipeline illustrate very different responses to the key issue of driving usage (traffic) to the new platform: whilst the Department of Health outsourced, and incentivised, responsibility for this to the private sector, HM Land Registry sponsored the discovery/proof-of-concept with a view to the market taking over, and Pipeline relies on the emergence of common procurement requirements across councils over time to incentivise the market. For commercial two/multi-sided platforms (Eisenmann et al., 2006) the developer will typically offer the underlying technology to customers for free and take little or no profit for several years whilst they build the traffic and accompanying ecosystem of affiliated service providers onto their platform (Parker, Alstyne, & Choudary, 2016). We thus conjecture that incentivising traffic should form a pivotal component of platform policy for governments and call for further research on platform incentives in the public sector. It is, for example, unclear whether this insight has been understood by government in say, the UK Verify example, which appears to have been conceived and executed as a technology project on a ‘build and they will come’ basis. In our view, it is telling that the UK’s NAO report on Verify entirely omits this apparent failure by government to understand fully the nature of what it was trying to build and the incentives surrounding its use.

4. Government as decentralised partner

At the other end of our spectrum, the literature contains several examples of *government as decentralised partner* that resemble looser associations of actors – often on more or less equal terms, rather than state services co-ordinated by government. For example, Klievink, van der Voort, and Veeneman (2018) explore the complex dynamics of an infomobility platform as an example of ‘data collaboratives’ that span the individual and collective, state and private sectors; van der Graaf and Ballon (2019) extend the above notion of ‘smart’ or ‘platform’

¹⁶ <https://pipeline.localgov.digital/>

¹⁷ <https://localgov.digital>

¹⁸ <https://gds.blog.gov.uk/2018/07/04/launching-the-local-digital-declaration/>

urbanism further by highlighting a ‘digital standoff’ of tensions between platforms (such as Waze) providing traffic information and urban planners over control in a way that suggests a blurred and complex platform-based ecosystem encompassing private and public organisations and people/citizens; Wang and Medaglia (2017) focus on social media platforms’ role in ‘temporary organisation’ of loosely collaborative projects between government and external stakeholders involving looser and more flexible notions of time, power, and resources; and Hansson and Ekenberg (2016) examine community software that seeks to support democracy from the micro-perspective of the actor, rather than that of the government, altogether.

These examples show that in being a decentralised partner, government must add value to others, something increasingly achieved by making its data available. Open data policies “aim to stimulate and guide the publication of government data and to gain advantages from its use” (Zuiderwijk & Janssen, 2014, p.17). Cultivating heterogeneous innovators that can harness and use the data for new services and thus create a vibrant data platform ecosystem is challenging, with Bonina and Eaton (2020) providing policy advice on this based on research in Latin America. Interestingly, openness of data creates the context for participation of non-governmental actors even in places with less collaborative political cultures such as Kazakhstan (Kassen, 2017). It has also, however, been associated with promoting market-oriented neoliberal objects as an exercise in informational power (Bates, 2014; Srmicek, 2017). This is particularly evident in the rise of blockchain technologies (Swan, 2015) whereby blockchain can impose rigorous governance on government (Ølnes, Ubacht, & Janssen, 2017) – for example by imposing immutable trust arrangements.

4.1. Government as data source platform: government assumes role of platform providing data in an open fashion to a marketplace. Government assumes little / no risk. Platform is open in access and usage

One variant of *Government as Decentralised Partner* that we identified is based on government opening some of the huge quantity of data in its possession in the hope of growing an ecosystem of innovation and economic activity from others harnessing this shared platform of data. A well-known example in the UK is the Department for Transport’s National Public Transport Access Nodes (NaPTAN) database,¹⁹ which has become an essential part of services provided by others such as Traveline, Citymapper and Google Maps. Indeed, NaPTAN is an example of government acting with strategic foresight to re-imagine its strategic purpose away from merely providing services to citizens, towards inviting innovation and investment around these services based on an understanding of its unique market-making position; it is currently following up with a national open data portal for buses.²⁰

Another example is the Financial Conduct Authority’s (FCA) Open Banking Initiative.²¹ whereby the UK’s FCA reimagined its strategic purpose from regulating the UK’s financial services organisations to using its unique trusted position as regulator to enable retail banks to clean and release consumer transaction data to third parties. In turn, this ‘ecosystem’ of third parties, often new entrants and/or start-ups attracted by the ‘platform’ of available data, may be able to offer new, innovative products and services that do not exist in today’s marketplace. In this example the FCA’s strategic re-imagining of its public purpose from regulator to economic engine appears particularly striking.

A final example is the emerging strategy being followed by the newly created NHSX organisation, tasked with enabling the UK National Health Service (NHS) to transition gradually to a digitally-enabled business

model. In the British Medical Journal,²² the NHS Chief Executive appeared to acknowledge the importance of NHSX’ central role in setting standards for interoperability and data flow, without constraining the possibilities for innovation of a growing ecosystem of public, private, and third sector organisations.

4.2. Government platform ecosystem: the market creates a government ecosystem with the benefits accrued across the ecosystem, promoting the harnessing of standardised capabilities. This is a purely open platform, with benefit accrued by all

Another variant of *Government as Decentralised Partner* can be drawn from an interesting example where a commercial platform supplier to government has understood its potential to help government to behave like an affiliated ecosystem. It does this by leveraging the common capabilities of the platform and building, sharing, and ultimately commoditising specific capabilities between themselves. Jadu is a UK-based CRM/content management platform provider, primarily to local government and higher education organisations. With an installed base across over 75 local government organisations, it realised that many of these organisations were duplicating the functions they were building onto the generic platform over and over again, and thus that there was an opportunity to behave more like a ‘platform business’ than a ‘technology platform supplier’, by working to grow its ecosystem among public sector organisations (Thompson, 2018) see also (Fishenden, Thompson, & Venters, 2018). The resulting ‘Jadu Library’²³ was launched in early 2018 and provides an online, Github-hosted repository of code libraries, APIs, training and support, etc. that is accessible for free by all Jadu customers. It is intended to encourage councils to re-use one another’s specific functions rather than build them anew. As in *Platform from Government and Market led Government Platform* however, it remains too early to say whether this approach to platform consolidation in the public sector is a viable model for the future, owing to the dependence on public service organisations’ willingness to share (which is itself dependent on the ability of organisations to visualise collectively the benefits of doing so).

4.3. Discussion of government as decentralised partner

Turning to the IS/IT platforms literature, both *Government as Data Source Platform* and *Government Platform Ecosystem* variants are almost entirely open in terms of innovation potential and thus fully decentralised, with the government only retaining control of the boundary resources (e.g. interfaces, APIs and standards) and governance arrangements (e.g. data architectures or access rules through standardisation) and setting the roadmap for the future access arrangements, or in the case of *Government Platform Ecosystem*, only as a dominant customer of the platform. We note however that dominant platform stakeholders can have considerable power (Eaton et al., 2015; Elaluf-Calderwood, Herzhoff, Sørensen, & Eaton, 2011).

Such a model may be particularly useful for local services (e.g. health, social care, housing, blue light, third sector, and local government) where the value-added activity (directly serving the public) might need to continue to be within highly localised silos (see Fig. 2 and the grey bars for silos) and directed at very specific needs (e.g. health-service needs in a local area, delivered on a multi-agency basis, with possibilities for empowering local actors) but the underlying infrastructure is typically duplicated wasted activity that might be better provided by a standardised ecosystem of services. A platform ecosystem model offers considerable benefits by harnessing an open marketplace of standard services, to standardise and centralise this wasted activity. An analogy of this might

¹⁹ <https://dftdigital.blog.gov.uk/2016/10/01/from-a-to-b-and-back-again-upgrading-a-flagship-open-dataset/>

²⁰ <https://www.publictechnology.net/articles/news/dft-build-nationwide-open-data-portal-buses>

²¹ <https://www.openbanking.org.uk/customers/regulated-providers/>

²² <https://blogs.bmj.com/bmj/2019/10/04/richard-smith-the-thinking-of-the-new-chief-executive-of-nhsx-which-is-charged-with-digitising-the-nhs/>

²³ <https://www.jadu.net/library/>

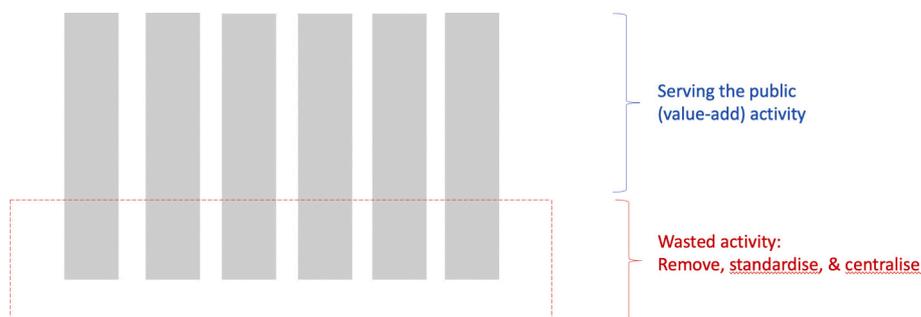


Fig. 2. An ‘open marketplace’ approach to cloud-enabled public services, involving government as decentralised partner.

be estate-agent services with local websites, advertising and video production, which is provided by local branches and configured closely towards local need. Here the data (maps, housing-data, property-price information, local schools data) is shared through standardised boundary-resources, governance arrangements and cloud-based infrastructure which reduces replication and waste and which might be provided by entirely different commercial organisations.

For such ‘open marketplace’ platform approaches involving government as a decentralised partner, a development roadmap is important for ensuring trust in the openness over time and to justify and incentivise commercial investments (Tiwana & Konsynski, 2010). For example, building Apps based on OpenBanking standards (a *Government Standardised Platform* example) requires trust such that standards do not change significantly over time. Further research is needed on such processes of change, however policy responses must be consistent with openness, decentralisation and trust and must be slow to change; crucially knee-jerk responses should be avoided despite political changes in government. Such marketplaces will be emergent over the long-term and will reveal tension between open and closed models: the earlier example of NHSX’ role within the emerging health data economy (*Government as Data Source Platform*) is a good example of the careful marketplace governance that will be needed as commercial companies tussle in various ways for economic benefit (van der Graaf & Ballon, 2019), particularly around exploiting data (Eaton et al., 2015; Venters, Oborn, & Barrett, 2014). Indeed it may be fruitful to conceptualise the role of government in developing data ecosystems (Alaimo, Kallinikos, & Valderrama, 2020) in which the public value is created by the systematic harnessing of different types of data from different sources and services (ibid).

For *Government as Decentralised Partner*, where government has the least control in our spectrum, government must arguably play even closer attention to understanding its role in the emerging market dynamics, which may involve a complex range of actors (Hanseth & Lyytinen, 2010; Wagelaar & Van Der Straeten, 2007). da Silva Craveiro and Albano (2017)’s description of governmental support to building intermediaries exemplifies the care that this may require. In the case of the more extreme models, such care is likely to extend to managing the impact of creative destruction; the battle between Uber, London Taxi drivers and TFL in London reveals how politically challenging these issues can become.²⁴ Recent research has highlighted the need to cultivate an emergent polycentric governance model (Constantinides & Barrett, 2014; Mindel, Mathiassen, & Rai, 2018) through the mutual adjustment of all those actors involved, in contrast to the centralised governance usually associated with government IT, or private market forces associated with marketplaces.

As custodian of the data, the government must engage seriously with the privacy and security concerns of citizens, particularly when data is ‘mashed-up’ with that from other sources by external companies

(Zuboff, 2019). It is important to note the significance of cultural norms here: for example, it is clear from Caprotti and Liu (2020)’s discussion of platform urbanism in China that some of the innovations (such as the pervasive infrastructural importance of WeChat) would attract criticism in some Western democracies – although even here alarm is growing at, for example, Amazon’s growing role as a public utility during Covid-19.²⁵ Fundamentally, those making policy decisions need research to better understand that they are focused on citizens who receive the service in a way that is similar to internet platform companies’ relentless focus on customers’ needs but remaining mindful of the ethical differences between public and private sector aims, however blurred the delivery model may become. Finally research should examine how new platforms in which government is a decentralised partner (e.g. those based on blockchain) may require government regulation in their initial structuring lest they circumvent traditional regulative control mechanisms (Vergne, 2020) in the longer term.

5. Discussion of the typology

The aim of this research was to address the question “*What different models are encompassed by the term ‘platform’ in the context of government IT, and what are the associated roles played by government within each?*”. Our typology (shown in Table 2 below) provides a spectrum of three genres, each comprising two definitional variants, yielding six different potential answers to this question with an outline of the different role played by government in each. These definitions span a broad spectrum of conceptualisations of the construct of ‘Platform’: from vertically-integrated technological ‘platforms’ built by government, or by corporations and licensed to government, in which ‘platform’ is conceptualised largely as a piece of technology, through government as neutral arbitrator, towards increasingly hybrid models entailing the building and support of intermediaries and ending with fully decentralised models of open innovation enabled by standardisation (e.g. Bygstad & Lanestedt, 2017). The spectrum resonates well with Brown et al. (2017) who, through an empirical analysis of UK government IT projects, revealed considerable policy confusion caused by a lack of clear understanding of the differences between “platforms for government (PfG)” and “Government as a Platform (GaaP)”. Our proposed typology goes a long way to address the concern these authors raised.

Through our literature analysis it is evident that the government IT literature on platforms encompasses not only a range of examples of what *governments* think they are doing when they engage with the term but, tellingly, also a range of definitions indicating considerable diversity between what *academics* think they are talking about, as well. If, as Hall and Battaglio (2018) claim, and much of our grey-literature case study evidence suggests, public service is increasingly accomplished together rather than alone and if boundaries between actors are becoming increasingly blurred (see also Lex et al., 2019; Ruutu, Casey, &

²⁴ Uber spared from London ban despite ‘historical failings’ - BBC News

²⁵ <https://www.theguardian.com/commentisfree/2020/apr/17/amazon-coronavirus-public-utility-workers>

Table 2
Typology of platforms.

Benefits, Risks, Governance & Policy recommendations across the spectrum genres with suggestions for further research.	Definitions of Platforms for each genre of the spectrum with examples from the UK
<p>Government as Platform Builder: e.g. Kapoor et al. (2017); Margetts and Naumann (2017); Timeus et al. (2020)</p> <ul style="list-style-type: none"> • Benefits: Speed of delivery; control, flexibility; cost savings. • Risks: Duplication; proliferation of legacy; innovation/risk/upgrades shouldered by government; reinforcing of existing delivery models; limited data sharing & innovation; lack of skills. • Governance: Challenge of developing and adopting standards, avoiding reinforcing silos, and avoiding repetition of silos. • Policy recommendations: Central political sponsorship; common (open) standards; mindfulness of potential rigidity of service designs. • Further research: data-sharing practices, rigidity of platform technologies, transparency among organisations. 	<p>Platform from Government: Government undertakes a technology-focused integration project in which cloud-based services are integrated to provide an internal platform for innovation with intention to drive engagement into other organisations. UK case study examples: Adur & Worthing; Verify</p>
<p>Government as Platform Catalyst & Arbitrator: e.g. Schwabe (2019); Yu et al. (2019); Caprotti and Liu (2020)</p> <ul style="list-style-type: none"> • Benefits: Increased market innovation; Government shares risk; can transform delivery models. • Risks: Limited take-up/adoption; Government loses control; users do not trust platform; long-term delivery horizon. • Governance: Need to balance control with generativity. Need to promote trust among actors. • Policy recommendations: Understand business & delivery model; pay careful attention to incentivisation plan; define/communicate/reward clear roles. • Further research: How to balance openness and closedness in government platform initiatives. How to incentivise participation in government platforms. 	<p>Government led Platform: Government undertakes architectural work to identify common capabilities, but remains open to a mix of possible delivery models. UK case study examples: Scottish Government shared service patterns; Shared Resource Service Wales</p>
<p>Government as Decentralised Partner: e.g. Wang and Medaglia (2017); Klievink et al. (2018); Bonina and Eaton (2020)</p> <ul style="list-style-type: none"> • Benefits: Can enable local configuration & empowerment; commoditisation of non-value-add activities; increased data-driven innovation; transformational opportunities. • Risks: Short-term policy changes disrupt trust in model; potential conflict over commercial/data benefits; complexity of actors leads to confusion; privacy/security difficult to maintain; may be culturally specific. • Governance: Need for polycentric governance arrangements. Need to establish clear governance rules in advance of technology construction. • Policy recommendations: Develop long-term-consistent frameworks; clear attention to data governance/ownership; address privacy/security concerns; retain ultimate focus on public benefit. • Further research: How to roadmap the development of the platform. Polycentric governance arrangements in government IT. Designing governance into the government platform's construction. 	<p>Market led Government Platform: Government outsources risk of building marketplace to the market. Periodically opened to generative innovation through regular re-tendering. UK case study examples: Department of Health NHS Jobs platform; HM Land Registry blockchain project.</p> <p>Government Standardised Platform: Government creates an ecosystem in an open way, promoting others to harness standardised capabilities. UK case study example: LocalGovDigital Digital Declaration.</p>
	<p>Government as Data Source Platform: Government assumes role of platform providing data in an open fashion to a marketplace. Government assumes little / no risk. Open in access and usage. UK case study examples: Department for Transport NaPTAN; Financial Conduct Authority Open Banking Initiative</p>
	<p>Government Platform Ecosystem: The market creates a government ecosystem with the benefits accrued across the ecosystem, promoting the harnessing of standardised capabilities. This is a purely open play, with benefit accrued by all. UK case study examples: Jadu Library</p>

Kotovirta, 2017), then there is a strong case for a more consistent treatment of the diversity in the 'Platform' construct so that government IT academic literature can be clear about the type of 'Platform', and hence policy objectives, being discussed.

There is now a well-established literature exploring the dynamics of commercial internet-based platform models, in which platforms are seen as foundations on which others can innovate and invest, and where successful organisations can benefit from considerable scale, velocity of growth, and access to valuable data (for example see Alaimo et al., 2020; Constantinides, Henfridsson, & Parker, 2018). This literature has, however, been dominated by discussions of commercial platforms such as Amazon, Uber, TripAdvisor, Facebook and Apple's iOS. Within the public domain, the literature is much less established, as our comprehensive literature review above shows.

Relatedly, there is growing evidence of a lack of conceptual clarity among academics and senior government policymakers about how learnings on platform dynamics from the commercial sector might be taken and applied to the public domain, for public benefit. Just as a commercial platform entrepreneur might need to demonstrate clarity about the strategic and commercial purpose of their platform offering to an investor, so, our research suggests, public policymakers should be able to demonstrate the same clarity of thinking to the public. This is

especially important since many users of public platforms lack an alternative and can be among the most vulnerable in society (the so-called "edge-cases" discussed above). Similarly, as debates emerge about the risks of platforms to civic society (Srniczek, 2017; Zuboff, 2015, 2019) so we must foster discussion of such risks within the public realm.

Of particular importance is a focus upon the agency of government within the platform innovation. In contrast to the capitalist motivations of commercial platform companies, governments can (and perhaps should) undertake 'moon-shot' projects based on mission-oriented policy for positive change rather than profit maximisation (Rainer Kattel & Mazzucato, 2018). However, at present platform innovation is framed as being led by commercial enterprises (despite the significant role of government in the innovation of platforms technology (Mazzucato, 2018)). Platforms are only considered of government concern either as platform-users (e.g. government using cloud services) or once platforms have become infrastructural to society and require regulation (as, arguably, search, mapping, and social-network have now become) (Zuboff, 2015, 2019). In contrast, by harnessing differing platform approaches from across the spectrum, an entrepreneurial government could unleash innovation (albeit with needs to balance stability and agility) (R Kattel, Drechsler, & Karo, 2019) that drives new commercial platform innovation *and* innovation within government itself.

Although we have focused primarily on *government's* role within each platform definition, further research might develop our typology further by examining the role and agency of a combination of the government, citizen, commercial, and third sector within each of these definitions of platforms, consistent with a general blurring of roles that appears to be occurring within platform models across all of these actors. Certainly, our research suggests the need for further research into governance arrangements across our spectrum.

We do not claim to provide a complete typology of delivery models or associated roles; rather, our intention is to offer a heuristic set of definitions against which policymakers, as well as researchers and auditors of government technology programmes, can ask critical questions about the strategic and commercial purpose of a particular platform initiative. We would imagine that such policy questions might include: “to which ‘platform definition’ is this initiative most similar?”; “what are the respective strategic and commercial roles of government and its partners in this ‘definition’?”; “does the initiative deliver technology, or a service?”; “how is delivery measured?”; or “where does the risk lie?”. Such questions might help to ensure the appropriate delivery model is selected against a clearly-understood conceptualisation of purpose, and should provide fruitful starting points for further academic study.

We acknowledge that digital platform innovation is a process that is nonlinear and political (Klein, Sørensen, de Freitas, Pedron, & Elaluf-Calderwood, 2020). As such, during a platform-projects lifespan, it may move between our six definitions as governments engagement shifts and technology evolves (for example a *Government as Decentralised Partner* project struggling to attract innovators may subsequently evolve into a *Government as Platform Builder* project). Furthermore, a project might be broken into parts which resemble different elements of this typology (e.g. a *Government as Platform Builder* might be built for internal use but through an open-data API it creates a *Government as Data Source Platform* alongside it). Note for example Adur and Worthing’s *Platform from Government* which aspired to evolve into being a neutral arbiter in a *Government Standardised Platform* for COVID. Further research which examines the trajectory of projects across this spectrum and thus between these definitions would therefore be useful. In particular, how might a *Government as Builder* of technology project release control sufficiently to enable a marketplace to emerge? What happens when *Government as Decentralised Partner* fails to build an ecosystem, or operates undesirably, so requiring government intervention as catalyst and arbitrator? Those involved in policy may be wise to consider and plan for such evolution.

Our typology complements that of Ansell and Miura (2020) whose focus is upon governance platforms’ architectural leverage of interaction, production and innovation. This leads them to define three governance platform types: Open innovation, open data innovation and collaborative innovation. While complementing our typology these authors’ focus is upon the diffusion of governance through platforms whereas our typology focuses uniquely upon government as key orchestrator of the platform throughout. Even for *Government platform ecosystems* our cases reveal government having agency through devising standards and demands from the platform. This is important, since to date non-government platform literature has dominated. Indeed much platform literature appears to overemphasise the importance of industry-wide ecosystem platforms (Gawer, 2014) and commercial platforms (Parker et al., 2016) such as Apple iOS (Eaton et al., 2015) in which power is negotiated among keystone organisations (e.g. Apple) and other heterogeneous actors, and in which economic marketplace incentives operate. In contrast, we would argue that platforms in Government are often closer to resembling in-firm internal organisational platforms (Gawer, 2014) to the extent that agency remains strongly with the government over the platform via standards setting, economic might, and, in particular, control over legislation.

Coupled with the reality that governments are often hampered by bureaucratic governance processes which favour control and closed innovation of platforms (Mergel, 2017) it is little wonder that government

platforms have tended to become more *Government as Platform Builder* than *Government as decentralised partner* despite the aspirations set out in the “Government as a Platform” ideas (O’Reilly, 2010). This suggests the need to consider further the regulation of platforms and Government’s agency within these and, as Ruutu et al. (2017) highlight, consider their use of regulation to promote or even mandate open harmonised interfaces and standardisation to promote platform ecosystems. Indeed, we would agree with Luna-Reyes (2017)’s critique of the lack of attention to questions of regulation of government’s agency – and welcome their suggestion promoting the use of platforms themselves to bolster democratic participation in platform innovation (for example through e-consultation within a platform strategy).

Finally, further research might invert the focus of our typology and instead ask what government itself is (and should be) within each of our genres. Might government itself be better represented by a decentralised partner model – becoming less ‘Weberian bureaucracy’, and more ‘innovation platforms for entrepreneurial citizen service delivery’ – or, to paraphrase Dunleavy, Margetts, Bastow, and Tinkler (2006), government becoming their own ‘platform’ for citizen, enterprise and civil society. Government might thus ultimately become a platform innovator supporting the building of platforms for citizens.

6. Conclusions

The application of platform models within the public domain offers may attractive possibilities to policymakers. These include economies of scale, crowdsourcing from an ecosystem of innovation/investment attracted by consolidated demand and data, and significant infrastructural benefits. Fundamental to achieving such benefits, though, is the development of a clear understanding of what is meant by ‘platforms’ against the diverse spectrum of understandings, and associated models we have presented here and, in particular, the nuances of the various delivery and commercial models that attract a ‘platform’ label, with particular focus on the role played by government. Such understanding will benefit academics, government technologists and suppliers alike. In response, this paper devised a clear typology of the present diversity in public sector ‘platform’ approaches within the academic literature, as well as in practice, and explored the markedly differing role of government itself within each. While we do not claim that such diversity would be a surprise to many readers, it is important to note the assumption among many policymakers and academics that platforms in government share a uniform purpose and approach, and that the function of government is similar across all of these. Taking the UK as an example, we have shown that platform initiatives, and associated roles, vary considerably in strategic and commercial purpose.

Our typology holds important practical implications for policy, planning, funding, execution, and evaluation of government platform initiatives. Our identification of six platform definitions across three genres in the spectrum enables a wider conversation about the development of a more systematic understanding of each that includes their strategic and commercial objectives, delivery models, risks, governance, roles, incentivisation structures, likely architectures, degrees of openness, etc. that we have discussed here.

In terms of specific policy recommendations, our analysis highlights the importance, across the whole spectrum, of central political sponsorship of a platform, the promotion of open standards, long-term planning, attention to incentivisation and the need to be clear about privacy and security implications (Table 2 breaks these recommendations down further). Our research however also highlights how the approaches to governance and regulation differ considerably across the spectrum.

We readily acknowledge the necessary limitations in the scope of a journal article for such an undertaking, and (in addition to suggestions for research outlined for each genre of the spectrum) suggest further research differentiating, and understanding, the spectrum further. For example, future research might usefully examine how well these six

definitions resonate outside the UK, so developing a broader, more comprehensive typology of platforms across public sectors globally, and then using this broader understanding to compare and evaluate government responses to these opportunities, or even combinations of these. We conjecture that generic policy ‘playbooks’ against these platform definitions might offer valuable heuristics, in which key decisions, potentially suitable policy frameworks, and supporting case examples might be assembled to support policymakers and practitioners across the public sector. Such ‘playbooks’ may also offer academics new conceptual tools to engage more proactively and impactfully in understanding, and shaping, such decisions.

Declaration of Competing Interest

First author conflicts of interest: The First author co-runs a government transformation technology services company, which has given him periodic access to interesting empirical examples to use as case studies. However, there is absolutely no financial or other interest involved in these above their general interest and relevance to this topic.

Second author conflicts of interest: none.

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