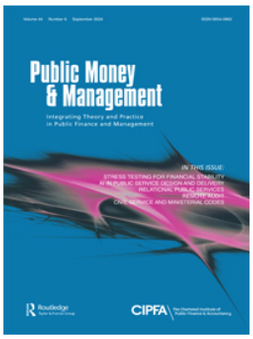

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The political economy of digital government: How Silicon Valley firms drove conversion to data science and artificial intelligence in public management

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IMPACT

The relationships between digital governments and private digital technology corporations shape investments that endure for years, even decades. Yet recent changes have been under-researched in public management and accountability studies. Until the 2010s systems integrators (SIs) were dominant, producing proprietary legacy computer systems that still shape government technologies today. Since that time, governments have become increasingly reliant on the online tools and cloud technologies developed by Silicon Valley (SV) firms and platform corporations. To keep digital investments in line with business and civil society progress, governments have had to catch up and innovate with the latest generation of data-intensive technologies, such as artificial intelligence (AI), and to adopt some SV organizational culture and practices in government. However, previous long time-lags in public sector responses highlight many lessons for today's digital government change pioneers. In particular, the article illustrates the importance for digital managers of accelerating change in government organizational cultures, and developing the expertise to manage contractual diversity.

ABSTRACT

Until 2010, Anglosphere digital governments struggled to modernize, dependent on large-scale contract relationships with global systems integrators (SIs) and elderly, custom-built legacy systems. Policy-makers have (belatedly) converted to the value of the latest Artificial Intelligence (AI) technologies for improving government. Using elite interviews with government officials in three Anglosphere governments, this article traces the origins of this conversion back to Silicon Valley (SV) and platform corporations. These massive firms drove cultural, organizational and technological developments that reduced the influence of SIs. Going forward, SV firms' practices will now drive public management use of data science and AI, shaping financial systems and practices. Drawing together elements from business studies, organizational change, public management reform, digital government and AI scholarship and practice, the authors show how government's relationships with SV firms re-shape political economy relationships and bring digital change in government closer to SV ways of working.

KEYWORDS

AI (artificial intelligence) in government; cloud computing and government; digital era governance; digital government; public management reform; public sector contracting; public sector IT; system integrator corporations

The 2020s has seen huge interest from political and administrative elites in the potential of data science and artificial intelligence (AI) to improve government. This interest shot up in 2023 through developments in large language models (LLMs), when the firm Open AI launched Chat GPT, a consumer-facing LLM interface. Meta and Google soon followed suit with their own LLMs. By 2023, one senior US science and technology policy-maker was proclaiming 'AI is having a moment— and policymakers cannot squander the opportunity to act' (Nelson, 2023). This conversion of policy elites to the importance of digital, data-intensive innovation for the public sector comes after decades of governments lagging increasingly behind firms in their adoption of successive generations of technology. The 2010s witnessed a behind-the-scenes transformation which we seek to explain.

This article charts the process of conversion during this decade, tracing all the main developments back to Silicon Valley (SV): the heart of the wider technological revolution that has brought such profound change to society and the business world. SV's influence over digital government today represents an important development in government's ceding of control of its technological infrastructure, outsourced to global systems integrators (SIs) during the 1980s–2000s (Margetts, 1999; Dunleavy et al., 2006a). In this earlier era, huge government contracts were awarded to a limited number of SIs, keen to take on long-term partnerships and provide custom-built systems, but with no record for innovation. This time SV firms and their approach to development have achieved centrality almost as a by-product of their huge size, dominant societal role and the transformative nature of their technological innovations.

To illuminate this transition, we explore first the origins of government's slow progress towards digital modernization, and heavy dependence on SIs for all major financial systems. Then we identify four influences on digital change leading to ultimate conversion. From SV, our next section shows that the rapid global growth of digital, data-driven platforms and disruptive digital change increasingly challenged officials' view that public sector information systems are distinctive in terms of their scale or heterogeneity. Then we explain how acute policy crises in the USA and UK highlighted

government's woeful digital competences, forcing political elites to call in SV experts and ways of working to improve public sector competency. A discussion of the ways in which critical SV technological innovations, cloud computing and AI challenged governments' reliance on SIs follows. Finally, we show how SV platforms are embedded in every aspect of government going forward, with the SIs continuing to be important players. Anglosphere digital governments are now co-dependent on two sets of commercial actors, with major implications for financial management, reporting and accountability.

We use a mixed methods approach, drawing on documentary analysis; interviews with over 45 senior public officials, technology leaders and political representatives in the USA, Australia and the UK; and extensive participatory research and practical engagements with administrative elites in the UK during the period 1999–2023.*

Governments' slow digital modernization before 2010

Civil government departments in Anglosphere governments were leaders and innovators in large-scale computing into the 1960s, with the UK Post Office as a prominent trailblazer. But by the 1990s, in spite of massive investments, they were clearly laggards in the adoption of digital technologies (Margetts, 1999). By 2010, most civil government systems for processing transactions had fallen far behind those of large private firms. Their 'legacy systems' used outdated mainframe computers and old code, had very few links between them, and became increasingly unreliable (NAO, 2013; GAO, 2016). By 2011, a large proportion of the UK government's financial operations were reliant on legacy systems, which recorded at least £480 billion of government's operating revenues and £120 billion of non-staff expenditure (NAO, 2013). Failings of those systems are still being revealed in the 2020s, as illustrated by the UK's Post Office accounting system (Horizon) rolled out in 1999, which led to hundreds of sub-postmasters being falsely accused of financial fraud due to error-ridden accounting balances (Margetts, 2021).

These early systems were based on computer code which was rules-based, processing highly structured records of data relating to citizens or firms. They did not learn from the data; rather, any 'intelligence' was built into the code from the start —the anthesis of today's data science technologies. Government systems did not attract scholarly interest, as observed in the only comparative study of US and UK government information technology before 2000 (Margetts, 1999). The internet created new possibilities and initial enthusiasm for digital services from 1997 to 2003, when governments competed to achieve high spots in 'e-government rankings' produced by international organizations and consultancies. But these efforts were more about the competition itself (the UK once claimed fax machines as 'electronic service delivery' in pursuit of a leading place) than genuine root-and-branch reform. The UK, US and Australian governments' online services offer stabilized at disappointing levels in the 2000s—especially in UK social security administration (Dunleavy & Carrera, 2013). While technology-based innovation grew within defence and security, in the civilian state computerization mainly involved automating existing record keeping systems and paper-based processes.

One block on deeper modernization was the dependence of the Anglosphere governments on huge partnerships with global computer services providers. From the 1980s, information technology (IT) functions were progressively contracted out, 'outsourced' or privatized (sometimes involving whole IT departments) in the 'new public management' (NPM) style (Dunleavy et al., 2006b). Agencies were stripped of in-house expertise, often left without even 'intelligent customer' capabilities, let alone a grasp of systems development. Governments' outsourcing partners were SI corporations that strongly reinforced trends and attitudes (Pavitt, 2005). UK and Australian departments wrote huge, high-value, long-term contracts, for which only the largest providers could bid, resulting in long-term partnerships with such SIs as EDS/Hewlett Packard, Capgemini and Fujitsu, and big consultancies (for example Deloitte and Accenture). All the major financial systems of government were bound up in these contracts. The UK tax agency's (HMRC) £10 billion Aspire contract signed in 2004 with Capgemini and Fujitsu as joint providers (and later extended to last 18 years), was the largest, accounting for 84% of HMRC's total technology spend. US federal contracting legislation sustained far more effective competition than in the UK, but the scale of US contracts was still massive. As a result, in contrast to European countries where contracts were kept small, the 'contract regimes' that emerged in the UK and the USA, were characterised by continual weakening of in-house capabilities (Dunleavy et al., 2006a). An oligopolistic UK market of SIs responded slowly to the new scope for online services. Combined with departmental blind spots, this meant that by 2009 only 0.5% of UK social security agency DWP's interactions were online, despite over half its 'customers' having broadband internet access (NAO, 2009) lagging years behind tax systems (Dunleavy & Carrera, 2013). Before 2010 many officials lacked internet access at work, and were unable to even see their own department's digital 'offer' until they went home, as departments struggled to provide internet access for all staff under integrated contracts (NAO, 2007, 2009). The disproportionate power of SIs in contract relationships was a predictor of lack of success in the progress of digital government across seven countries (Dunleavy et al., 2006a, Chaps 4 and 5).

These relationships, combined with administrative elites' lack of interest in technology, sustained an enduring resistance to new developments such as the internet, charted across a succession of UK National Audit Office (NAO) audits (NAO, 1999; 2002; 2007; 2009). Even in 2005–2007 top UK and Australian officials still told us in interviews that government online services should be basic, 'plain-cooking' versions. Citizens visited only when they needed to pay taxes, claim benefits or complete regulatory

*The empirical research included extensive documentary analysis; 25 interviews with Australian senior civil servants in Canberra, Australia, carried out during 2015–2019 when Patrick Dunleavy held a visiting chair in Canberra; 20 interviews with senior federal and congressional officials and government IT leaders in Washington, D.C. during 2019, when Helen Margetts held a visiting chair in the Library of Congress in Washington, D.C.; extensive participation in discussions and meetings with senior officials in the UK government, as part of the authors' extended impact work with UK government departments from 2010 to 2023. All interviews were anonymised. Further details and related reading are available at 10.13140/RG.2.2.33965.70887

forms—so they would arrive anyway. Key cultural barriers to digital progress identified at the start of the decade (Margetts & Dunleavy, 2002) persisted through the 2000s. Looking back from the 2020s, NAO reports found that successive government strategies demonstrated a 'consistent pattern of underperformance' over a quarter of a century (NAO, 2021) and that digital change decisions had been 'made by generalist leaders who lack the expertise to fully comprehend and tackle digital challenges' (NAO, 2023). Failure to redevelop legacy systems (with only basic functionality) restricted policy change, inhibited digital modernization (Dunleavy et al., 2006a) and sustained 'information regimes' that were not designed to yield transactional data for policy-making, which in turn prevented the use of data science, machine learning or AI (Dunleavy & Margetts, 2023), keeping departments locked in the past.

Another serious block on digital change was the embedded assumption shared by most officials that public agencies were more 'complex' and difficult to manage than private corporations (Rainey & Bozeman, 2000). In interviews up to the 2010s, UK and US public officials painstakingly explained to us that the public sector was unique in terms of its size and scale; that distinctively onerous obligations meant they had to deal with the whole of the population (not just paying customers); and their need to respond to multiple, external political and democratic requirements, contrasted sharply with hierarchical firms. Generalist public managers used arguments based on 'Public Value' (Moore, 1995) to claim that they handled more complex multi-valent problems than those faced by large corporation managers, so could not employ the same technologies.

The rise of Silicon Valley and the end of public sector exceptionalism

Meanwhile, worlds apart from public sector legacy systems and SI partners, a radically new type of technology company had emerged on the west coast of the USA. Google, Apple, Facebook (later Meta) and Amazon grew into huge organizations from the 2000s onwards, with highly distinctive cultures and organizational structures. They developed in SV, a centre of US 'high-tech' development from the late 1950s, with incubations including the 1980s shift to personal computing, and popular use of the internet from the mid 1990s (Mazzucato, 2013).

The consumer-facing SV tech firms quickly evolved distinctively lean and entrepreneurial cultural, organizational, and technology practices (Baron & Hannan, 2002; Ries, 2011), radically different from industrial corporations, government agencies and their SI contractors. SV platforms focused hard on consumer service, stressing disintermediation (removing the 'middle-man'), direct communication with customers and continuous service simplification (Koch & Lockwood, 2016).

In complete contrast to government, technology and data drove everything. A major shift of power ('from "mad men" to "math men"') occurred in platform companies, advertising and other fields as expertise in digital measurement became critical (Viale et al., 2017). SV firms were 'digital first and only', powered pervasively by transactional data from their user base (Lee et al., 2000). Big SV firms' research and development concentrated on technologies with a data focus (Gawer & Cusumano, 2002). They led the shift to the cloud, spawning commercial cloud-based operations where massive virtual data storage services became available to any organization regardless of its size, location, or capability to maintain its own servers (Cusumano et al., 2019; Fogarty, 2012). They mined data on the inputs, behaviours and interactions of their users to continually develop their services operations, which in turn led to the development and commercialization of data-driven techniques and technologies, particularly machine learning and AI, previously developed in academic research institutions.

The SV landscape was dominated by relentless change and innovation-adoption. The platform firms grew at great speed, 'Blitzscaling' (Hoffman & Yeh, 2018) and creating or cornering market segments, financed by equity injections until swelling user numbers could justify an initial public offering (IPO) (Pollock & Gulati, 2007). A 'start-up' culture emerged where, financed by venture capital, new firms competed fiercely to be the first to market and the first to scale with new products (Casnocha & Hoffman, 2012). Compared to conventional industries, firms' dynamic prospects mattered more than revenues (Amazon turned a tiny profit only in 2004, six years post-launch). Start-ups become worth what investors would pay for a share of the enterprise and a bet on the equity worth of their core concept. A burst of second wave digital, data-driven start-ups later emerged, many also from SV (Taplin, 2017) such as Uber and other ride-hailing apps (Thelen, 2018), Airbnb in tourism markets, Deliveroo and UberEats in food delivery (Davis & Sinha, 2021) numerous fintech firms and crypto-currencies in finance, and new social media platforms (such as TikTok).

By the 2010s, SV platforms dominated the global organizational landscape in terms of innovation and expertise, setting technological, business and social trends (Lapowsky, 2014). Their size and investment power rendered them highly distinctive from conventional firms. As the successful architects of some of the most massively scaled, profitable and powerful corporations ever created, SV leaders came to speak with an almost unchallenged authority and legitimacy within the business world (Piscione, 2013). This dominance only strengthened as the firms continued to grow while apparently avoiding long-predicted problems of institutional conservatism and scleroses (Kenney & Zysman, 2016). Other industries made 'pilgrimages' to SV, 'seeking to experience first-hand the ecosystem that is disrupting their business. It's hard to find a company that is not trying to fail fast, be agile, develop products in sprints, and apply "design thinking"' (Keung, 2017, p. 13).

In the Anglosphere governments, no such lessons were drawn for a long time. Administrative elites initially saw SV firms as confined to an ultra-dynamic, consumerist world, far removed from their own 'big' unchanging systems. Throughout the 2000s SV innovations reached them only with long lags, reluctantly and partially filtered by their SI partners, software providers and global consultancy firms. Over time, however, it became clear that the 'Valley' was challenging the distinctiveness of the public sphere. An essential element of the SV platforms' success was their ambivalence in many conventional organizational culture dimensions (Cameron & Quinn, 2011), including the 'public'

Table 1. How SV firms challenged the 'specialness' of government and digital change.

	Claim about the distinctiveness of government systems	How SV firms changed things
Size	Government databases are very large, whole population systems, unlike firms' market-focused ones	SV companies achieved unprecedented global reach and size.
Non exclusion	Government must deliver services to all citizens, and cannot exclude users, especially those with costly 'exception' needs.	Platforms sought to include all possible users, since population-wide reach was key for advertising clout.
Equity of service	Agencies must deliver the same service to everyone. No 'customer segmentation' with people or firms, or differential pricing/ charging are allowed.	Platforms firms were increasingly required by public pressures, media criticisms and government regulators to provide level playing field access.
Sensitivity and privacy	Government handles information that is peculiarly sensitive and subject to much stronger confidentiality and privacy requirements than that handled by most firms.	Many platforms handle highly sensitive information and are trusted by customers to maintain their privacy on, for example, browsing histories or email contacts (to which governments are denied access).
Depth of information	To administer services and regulations agencies must hold deeper, more comprehensive records (for example medical records, criminal records) than the limited information held by businesses.	Platform firms hold a depth of information on consumers far exceeding that available to governments, such as online search behaviour, profiles, critical business data, and confidential interactions.
Authoritative records	Data held in state systems are peculiarly salient or foundational for people's lives and livelihoods (for example certification of citizenship, criminal records, or health information).	The accumulation of information about individuals held by platform companies means that (if permitted) data-driven analyses could uniquely and comprehensively identify individuals and link with other data.

versus 'private' distinction. They become increasingly 'fuzzy' or 'partial' organizational forms (Ahrne & Brunsson, 2019), representing themselves internally to company staff as tightly controlled, but externally as simply a facilities provider for hundreds of millions of their users (mostly with free access):

> *The service platforms can be conceived of as dualistic meta-organizations. At the centre of the company is a complete organization with membership rights and obligations. Beyond the centre … there is a peripheral organization which is a hybrid between organization and market … that only provides limited rights and duties to its members* (Nachtwey & Schaupp, 2021, p. 2).

Table 1 shows that all the pillar assumptions supporting officials' view that government digital systems were distinctive were severely eroded by the scale and nature of SV firms' operations.

In terms of size, even in large countries like the USA, government computer systems seemed minnows by comparison with the SV scale of operations—Facebook alone had a billion users by 2012 and two billion by 2017. The 'public utility' character of the SV firms' systems and 'free goods' also grew strongly. It became less and less plausible that government systems were more distinctively whole-population systems than those of social media or other platforms. Of course, consumers and businesses 'paid' for 'free' services by surrendering control over their data. Yet the omni-reach of the platforms also meant that virtually all sections of society dealt with them, as with the state. The excuse that government *uniquely* deals with the whole of society broke down.

Similarly, civil servants had long argued that every row factor in Table 1 cumulated in a special 'duty of care' applied to the handling, storage, and disclosure of public information—requiring uniquely strong cyber security protections, maintaining data siloes and prohibiting 'pooling' data collected for different purposes. But the platform companies also vigilantly protected customer confidentiality (critical for sustaining services demand) and developed some of the best cybersecurity systems globally. Claims that government databases contained especially sensitive or private information on citizens compared with that held by private firms, took a hard knock as the data accumulated by platforms increased, and their capacities for tracking and analysis vastly expanded. Of course, data losses and breaches by platform providers have occurred on large scales, but relatively few considering their billions of users, and certainly no more than have occurred from government systems. Throughout the 2010s citizens also proved *more* willing to entrust their most sensitive data to companies than to governments, in return for the convenience of—and later dependence on—free services.

Crises and elite responses

Anglosphere governments continued to resist SV ways of working into the 2010s, in spite of the platforms' hegemonic cultural dominance and their challenge to governmental exceptionalism. Administrative crises proved key in prompting politicians and administrative elites to change tack, in part generated by austerity policies in countries most affected by the global financial crisis from 2008.

The UK expenditure crisis

Cost savings via digitization became particularly salient in the UK, as running costs were pruned back drastically to stabilize fiscal imbalances. The Conservative-dominated coalition government (2010–2012) sought to cut civil service delivery costs by a third. Prime Minister David Cameron saw digital delivery as mitigating the electoral damage that huge cuts in public services might otherwise entail. Cameron appointed Francis Maude as Minister to the Cabinet Office to force through a programme of 'cultural change' in Whitehall that would get civil servants working digitally. Maude established a Government Digital Service (GDS) to meet new 'digital by default' targets that 80% of service delivery should be online.

Directed by the forceful and creative Mike Bracken, GDS grew rapidly into an 800 strong, central staff. GDS worked with Whitehall departments in multi-disciplinary project teams, tackling do-able, modular short-term changes in a collaborative, bottom-up mode. GDS 'show-and-do' methods aimed to inject digital capabilities and innovations into departmental workstreams and culture. Departments participated in shared services redesigns that contributed to the 80% target. The GOV.UK website was centralized and upgraded, and digital measurement strongly increased across all online services. Bracken encouraged agencies to

bring work inhouse and drew 'the line on bloated and wasteful IT contracts', with a pledge that 'no IT contract will be allowed over £100 million' (www.gov.uk press release, 24 January 2014). Bracken embraced SV practices, such as government 'sprints', and recognized the relevance of SV firms' practice for government:

> *Their relentless focus on their users, providing a better digital service, being able to react quickly to what users need. How they structure themselves internally, the fact that they've got the right disciplines and skills … They are all things that governments can learn from* (Ministry of Economy and Finance [France], 2017).

The SV influence was also clear in the weight that Bracken placed on an influential think-paper by the SV guru Tim O'Reilly (2011), 'Government as a platform', appointing a head of 'GaaP' and proposing that digital government should be remade as a public sector platform, with centralized data registries (drawing on 'X-Road' in tiny Estonia) and a distributed user framework.

At its peak, GDS was credited with saving £60 million and had reduced the UK government's reliance on the largest SIs—in 2015 the top 10 providers made up 39% of the market, down from 53% in 2013 (Desmond & Kotecha, 2017). But GDS was scaled down after 2015; Bracken's expansionist plans, staff growth and centralized expenditure having caught the attention of the Treasury and the largest spending departments. Transformational aims were replaced with incremental change objectives. Yet for a time, GDS had played an important role in raising digital awareness and bringing new expertise into government—at one point no senior digital hire could take place without the involvement of GDS leadership. Its temporary success was influential in the Anglosphere, with look-alikes set up in the USA (see below) and Australia. The Digital Transformation Office in Canberra, initially led by a UK official, achieved a similar but brief cultural change effect in Australian federal government in 2016–2018, before Australia's administrative elites converted a reconfigured DTA into a more 'mainstream' internal-regulatory agency (Dunleavy & Evans, 2019).

The US healthcare crisis

In the USA President Obama and his core staff largely neglected digital change in government during his first term (2008–2012), viewing it as a routine, pedestrian area safely left to the civil service and their SI partners to deliver. The president remained disengaged, although his interest in digital campaigning and SV contacts (Halpin & Nownes, 2021) translated into initiatives around 'C-suite roles' like chief information officers. Obama only appreciated the importance (and weakness) of government systems following an acute 2013 crisis over the implementation of his administration's flagship healthcare policy. The Affordable Care Act was launched on a federal website where people in participating states could sign up. It crashed within hours, to the delight of Republicans, and the whole Obamacare registration process (involving up to 40 million previously uninsured Americans) came close to collapse. *Time Magazine* commented:

> *It is a story of an Obama Administration obsessed with health care reform policy but above the nitty-gritty of implementing it. No one in the White House meetings leading up to the launch had any idea whether the technology worked* (Brill, 2014).

It quickly became apparent to White House staff that the system's problems were not going to be easily corrected.

As the depth of the crisis became clear, Obama's administration reached out to supporters in SV to bring in talented digital experts to rescue the initiative. A procession of SV 'hotshots' came to Washington, D.C.: temporarily at first. A 'trauma team' of technologists was formed including Mikey Dickerson (Google's top site-reliability engineer), who was 'widely credited with playing a central role in salvaging the HealthCare.gov after its disastrous launch'. Once the site went live again successfully, some of the new arrivals stayed on to address problems elsewhere in Washington, D.C. The White House created the US Digital Service (USDS), headed by Dickerson, intended to have 'centralized, world-class capability' (Scola, 2014). USDS was based loosely on the UK GDS and Mike Bracken was offered a role there (Ministry of Economy and Finance [France], 2017). USDS sought to 'recruit fancy engineers' initially for two years, taking a 'big pay cut to work for the public good' (as one interviewee observed). However, unlike the UK's centralized model, USDS staff were placed strategically across departments in a federated way to create a series of mini-digital services, with varying degrees of institutionalization. Further initiatives included a digital help unit in the General Services Administration (GSA), known as18F, and the Presidential Innovation Fellows (PIFs) programme, where external digital experts sought to introduce SV ways of working through 'a start-up government culture and the capacity to "push beyond"', as one alumnus put it. The programme recruited 135 professionals over the next decade, about half of whom went on to federal administration 'C-suite' roles, and others to vendors, often still working on government projects.

By the end of his second term, Levy (2017) argued that Obama:

> *… understood not only how technology could transform the way government services worked, but also technology itself. He got it … he regarded his tech teams as a pet project, providing them the ultimate air cover when they got caught up in the merciless wheels of government bureaucracy.*

Similarly, Trish (2018) described what she called 'the data-fuelled presidency', citing 'signature' drone strikes (extensively used by Obama) and extensive performance management in government. The president was both intrigued and concerned about the rise of AI. His CTO, Megan Smith (formerly Google), led and co-authored a measured report stressing the potential of AI to 'serve the public good and help solve some of the world's greatest challenges and inefficiencies', while also highlighting ethical issues (Holdren & Smith, 2016).

The new emphasis on digital change and SV influence in the federal government survived the Trump years (2016–2020) (Trish, 2018). Given his famed hatred of SV, the new president was widely expected to halt progress on digital change. Looking back to 2019, interviewees from GSA and the PIFs programme said 'we were expecting the worst with the new administration—we thought it would all get killed'. But the USDS, now run by ex-Google executive Matt Cutts, survived with around 200 staff. Its federated structure appears to have helped digital services to be resilient, by becoming embedded in major departments (notably the Defense Digital Service), which allowed them to grow

without attracting the attention of the Office of Management and Budget (OMB). Made permanent in Obama's last legislative act, the PIFs programme created a 'clan-like' network across departments that kept digital initiatives going. Their role (perhaps more modest than Obama originally envisaged) kept PIFs 'below the radar' of hard-line Republican hostility. Likewise, CIO appointments escaped the intense political attention paid to higher profile positions. New C-suite roles came in, with the 2018 'Evidence-based Policymaking Act' mandating chief data officers (CDOs) to focus on data analysis opportunities in all departments.

The Trump administration also looked to high tech to cut costs, creating an American Technology Council to 'promote the secure, efficient, and economical use of IT across the Federal government', bringing in SI bosses, many from defence. One longstanding commentator on federal technology argued that:

> *Everyone—regardless of party or politics—should admire aspects of the Trump administration's approach to technology: First, leadership [OMB and the CIO] did not throw out IT and modernization initiatives started under the Obama administration because they were 'not invented here', but instead assessed and built on what was working* (Spires, 2018).

Overall, the US government's impetus towards digital change (see President's Management Agenda, 2020) proved broadly resilient until the 2020 election. The Biden administration built on the progress that had survived, including in the 2021 $1.9 trillion pandemic rescue package a $1 billion Technology Modernization Fund, to modernize and improve technology across the federal government (*Nextgov*, 11 March 2021).

Technological drivers for digital change in government

The crisis-driven organizational moves towards acceptance of SV-inspired digital, data-driven modernization were boosted by shifts in technological development also originating in SV—cloud computing and the new generation of data-driven technologies, particularly AI.

The move to the cloud

Cloud computing drove a different way of thinking about digital technology, first in corporations. Storing data on the cloud, along with a range of standardized accessing and processing tasks, creates a scaleable service—but only if the client-side's in-house technology staff can tailor these components to fit their own organizational missions and culture. To manage a contract with a cloud provider, clients must understand the functions that they have outsourced; plus generate and provide the data themselves; and accurately identify the micro-services they require. In all these ways, cloud and 'software as a service' (SaaS) providers drove the breaking up of macro-service contract models (or 'total-sourcing') painstakingly built over decades by the SIs. Advocates for 'enterprise resource planning' (ERP) systems sought to manage all core business processes (including especially finance and accounting) incorporating SAP and Oracle SaaS products, claimed that 'digital transformation' was 'much more of a fluid process': 'RIP systems integrators' (Esherwood, 2019). SIs were left with the more minimal role of helping companies transition to cloud services and customizing ERP systems (Bird, 2019). Businesses on a growth curve could up-rate their scale of operations by simply buying more server space and support, without undertaking the capital account mega-projects that SIs cherished. Some SIs (such as Accenture and IBM) initially developed 'small cloud' corporate models for clients (Venters & Whitley, 2012, p. 180). But the SV platforms quickly dominated the cloud provider market, particularly Amazon and Google, and later Microsoft.

Government departments initially resisted business trends towards cloud computing and SaaS. In the Anglosphere public budgeting processes, cloud provision sat on the revenue side of a capital/revenue split, a centuries old pillar of fiscal rectitude (government must not borrow to finance current spending). Cloud use threatened 'capital spending' procurement associated with 'big bang' IT modernization schemes that administrative elites valued as supplementary funding opportunities. Cloud provision also seemed demanding in terms of the expertise required of in-house government technology staff, compared to the 'security blanket' that SIs provided to federal officials. Shared responsibility for cybersecurity felt risky, partly relocating the blame for lapses with agencies themselves rather than buck-passing to inclusive SI contractors. In the USA, cloud computing challenged CIOs, removing their authority over technology issues and bringing a 'culture clash' (*ExecutiveGov, 2011*).

However, throughout the 2010s cheaper cloud provision, a growing market of cloud providers fuelled by business needs, and central agency pressures to use cloud gradually overcame this resistance. A 2010 Presidential Executive Order (EO) required federal departments undertaking new IT projects to 'consider if cloud provision was suitable for their needs', with OMB and GAO backing (McClure, 2010). From 2011 a federal programme registered cloud providers as compliant with government security requirements, giving departments additional assurance. Amazon Web Services (AWS) was the first platform firm to establish their own public sector division in 2012 and early to get registered.

'Cloud service firms often adopt a hybrid strategy in which computing capacity [available to clients] comes from a combination of their privately owned infrastructure and a public infrastructure provided by vendors' (Li et al., 2023). This makes serving large private firms and government clients easier for cloud providers (than serving many small customers in a market), so long as the vendors can be assured of their client's capacity and expertise. The main US cloud providers developed training and 'certification' programs for clients' technology staff, helping to incentivize them to develop digital specialisms as part of professional development. The arrival of central digital help-units like GDS (from 2011) and USDS (from 2012) meant that smaller agencies could experiment with cloud provision. Departmental elites started to accept the industry message that cloud computing allowed 'elastic computing', where they could use only the services, storage or computing resources they needed, or share them across agencies, rather than paying upfront for software or unused server capacity. And cloud provision cut the risks of massive cost over-runs and time delays accompanying major project development.

All these factors helped agencies to see, finally, the benefits of cloud provision. As one senior GSA administrator argued:

> *Cloud computing is a service. This is fundamentally a shift for government … It's a shift that promises rapid scalability and a more nimble approach to federal IT … We want to be able to turn things up quickly or turn them down, do it on demand* (*ExecutiveGov, 2011*).

In this way, cloud provision moved digital issues to the centre of departmental thinking. Departments invested in upgrading their digital capabilities, enabling them to better monitor cloud contracts. OMB progressively strengthened encouragement to use cloud provision across the 2010s, until federal agencies were virtually required to opt for cloud provision to get new projects approved.

The migration of larger civil government services to the cloud continued during the Trump years. From 2016–2019 the proportion of email across federal government that was cloud–based doubled to 70% (GAO, 2019). The Medicare Payment System (including 10 million lines of very elderly code) was moved onto the cloud (slowly) by USDS (Silverthorne, 2018). In defence, President Trump repeatedly intervened to protect coalitions of system integrators with Microsoft in protracted battles with AWS (owned by Jeff Bezos, whom Trump detested) to win the JEDI mega-contract of £10 billion for cloud services. Resolution came only in 2022 when the Biden administration enforced a contracting coalition of AWS, Microsoft, Google and Oracle (ZDNet, 8 December 2022).

US developments were mirrored across UK government, where a 'cloud first' policy for IT procurement came in in 2013 (Flood, 2013). AWS became the dominant cloud provider (Tussell, 2021). For example on 1 December 2023 AWS started three three-year contracts with HMRC, DWP and the Home Office, to a value of nearly £894 million (*Computer Weekly*, 12 January 2024). Case studies of local authority-scale cloud adoptions showed most promised benefits were realized (Jones, 2015). But, in a Swedish local council study, management accountants in central jobs were more enthusiastic about cloud ERP, while grass roots managers missed previous flexibilities in accommodating diverse needs and situations (Carlsson-Wall et al., 2022).

Elite conversion to AI

In the later 2010s, a 'hype cycle' developed around using SV-developed data science, machine learning and, later, AI technologies as digital modernizing tools for government. Administrative and political elites started to recognize AI as a key area to show national leadership, and to improve government itself (Margetts & Dorobantu, 2019). In the USA, although Trump personally took no interest in AI (and his support base resisted job-threatening AI developments such as autonomous vehicles), the AI agenda was driven forward by Michael Kratsios, his 32-year-old *de facto* (and later, actual) Chief Technology Officer. He was SV-raised as Chief of Staff to Peter Thiel, a Trump donor who founded Palentir, a company with SV origins and heavily involved in national security, used by the National Security Agency (NSA), the FBI and the CIA. Kratsios wrote a 2019 EO (Ghaffary, 2019), stressing that the USA 'must drive through technological breakthroughs in AI' particularly in national security, the federal government, industry, and academia. He persuaded the president that AI would actually create jobs (Kratsios, 2019). He was very proud of both the EO ('unusual to have one on a particular technology') and a 2018 Inter-agency Select Committee on AI set up 'to improve the coordination of Federal efforts related to AI' (Chappellet-Lanier, 2018), with a defence and scientific focus, and representation from agencies such as the Department of Defense (DOD), Energy and the NSF. As one elite political official put it:

> *You have all the leaders there in the room—it is not like having someone as head of AI, who then has to go to their boss and all the way up the food chain to get resources* [as normally happens with a new technology]—*you have all the people who can sign off on budgets right there.*

US administrative elites saw how this wind was blowing and piled into AI projects, not least as a way of evading IT budget clamp-downs. Thanks to Kratsios' AI evangelism, in the 2020 budget, AI was highlighted in the important short budget memo. Agencies were mandated to make 5% cuts across the board, on everything *apart from* AI [and quantum computing]. So categorizing digital initiatives as AI allowed agencies to protect digital spend (Ghaffary, 2019). Stressing AI hastened the replacement of inadequate legacy systems already underway with the CIO's backing (GAO, 2016), because 'the older legacy systems are, the less useful data they yield', as one interviewee put it. These moves may have accelerated agencies' building of AI capability. A Stanford University study of AI use in 142 civilian departments and agencies at the end of the Trump era found that 'nearly half of the federal agencies studied (45%) had experimented with AI and related machine learning tools', that lacked sophistication but were 'already improving agency operations across the full range of governance tasks' (Engstrom et al., 2020). As with cloud use, there was evidence of re-internalization of expertise, with implications for SI relationships: 'A majority of profiled use cases (53%) are the product of in-house efforts by agency technologists. This underscores the critical importance of internal agency capacity building as AI continues to proliferate'.

In the UK, elite interest in data science and AI for government was pushed forward through a succession of strategies. For example, the National Data Strategy (2020) sought 'to harness the power of data to … improve public services and position the UK as the forerunner of the next wave of innovation' and the National AI Strategy (2021), pointed to 'AI transformation of the public sector'. AI institutions were created, including the AI Council (2019–2023) and the Office for AI (from 2018), later consolidated in the new Department for Science, Innovation and Technology. Press releases and publications mentioning AI rose from 15 in 2015 to 350 by 2023. AI and data science received the ardent interest of Dominic Cummings, PM Johnson's key advisor from 2019 to 2020, who created a No. 10 data science team and brought the UK data science firm Faculty into government.

In both countries, a driver of policy-makers' attention to SV technologies came from the second burst of start-ups such as Uber. UK regulators were forced to build capacity and expertise in data science and AI (Aitken et al., 2022), to regulate impenetrable digital marketplaces. In 2023, the UK

Online Safety Act charged the regulator Ofcom with tackling an increasing range of AI-powered harms, causing Ofcom to ramp up drastically its data science capability. By 2023, the UK government had turned their attention to AI risk, influenced by a philosophical strand of SV thinking known as 'effective altruism' (focusing on existential risks). They held an AI Safety Summit in Bletchley Park in November 2023, attended by political and technology leaders from across the world and set up the AI Safety Institute, charged with tackling existential safety issues from future generations of AI. The USA followed suit with its own Safety Institute (embedded in the National Institute for Standards and Technology), and an EO focused on maximizing benefits and minimizing risks of AI for government.

Discussion—SI legacies and the entrenchment of SV influence

Anglosphere digital governments started the 2010s reliant on major outsourced relationships with system integrator partners. They reached the midpoint of the 2020s less reliant on these contractors, owing to some reinternalization of expertise, in large part driven by technological change towards cloud computing and AI. But there was plenty of evidence to show the continuing influence of the SI firms. In the USA the reliance of many states on '40-plus years old' legacy computer systems (written in Cobol, a 1960s coding language) to process covid-related unemployment claims, led to crashing systems during Covid, and a 'desperate need for Cobol programmers' (Gurchiek, 2020). Lack of digital, data and data science capacity proved a crucial factor in limiting governments' dynamic capabilities to govern in the pandemic (Mazzucato & Kattel, 2020).

In the UK in 2024, the Post Office Horizon scandal illustrated the dangers that legacy systems hold for accounting and financial reporting. A very popular TV drama highlighting major faults in the Horizon accounting system, developed by Fujitsu and rolled out in 1999, and inhumane treatment of Post Office local sub-postmasters when it showed false accounting imbalances across the accounting network. It showed how SIs such as Fujitsu could control financial information across an organization. Having previously described its audit data as 'gold standard', Fujitsu admitted to withholding evidence of known errors in the system from as early as 1999, meaning that neither the Post Office management nor any of the post office sub-postmasters had 'ground truth' accounting information throughout the two subsequent decades. Fujitsu were even paid additional sums to provide accounting data for the prosecutions of 900 postmasters, which proved in court to be fallacious (*The Financial Times*, 27 January 2024). The fallout revealed Fujitsu's continuing influence, as it emerged that they had been awarded over £4 billion worth of contracts across government (including in HMRC and the Financial Conduct Authority) even since 2019 when their role in Horizon's defects had been highlighted. They continue to operate the Horizon system itself (*Computer Weekly*, 22 November 2023).

Horizon is unlikely to be the only system—or even the only accounting system—where problems emerge from SI relationships. In 2022 Capgemini won a £235 million contract to look after the legacy Aspire technology for HMRC; and this was eight years after HMRC announced their plan to replace the deal to 'take greater control of its IT services' (*The Register*, 28 March 2022). At one point Capgemini forced extensions on Aspire services as a condition of agreeing to other services being transferred to HMRC (NAO, 2016). In January 2024, the head of the NAO described the UK pensions system (already identified as an issue in NAO, 2013) as 40 years old, in 'a troubled state', with 'out of data IT systems', 'crumbling infrastructure' and 'growing maintenance backlogs' (*Financial Times*, 16 January 2024). As well as causing operational problems, such systems constrict innovation in accounting systems across government, Indeed, it is likely that the slow move towards accrual accounting in the public sector during the last decades has been constrained by the cost and expertise implications of replacing or adapting legacy public sector-specific financial management systems built for cash accounting, as highlighted in historical analysis for Australia (Guthrie, 1998).

Meanwhile, throughout the 2010s Anglosphere governments developed a new co-dependence—on the SV giants. We have shown here how the key origins of policy-makers' enthusiasm for data science and AI were driven strongly by SV firms, which demolished every insulating assumption about the necessary distinctiveness of public sector organizational missions and digital cultures. Their vastly superior size, cybersecurity, capacity to amass and analyse sensitive and important data, their continual capacity to disrupt the organizational and regulatory landscape, their pervasive influence on daily life, and citizens' relative willingness to interact digitally with them, have all contributed. Administrative crises prompted the active importing of SV-grown staff into senior government technology roles, and (toned-down) imitation of SV work practices more generally. Both the affordances and the requirements of cloud provision and AI forced policy-makers and regulators to accept the importance of expertise and knowledge transfer and re-internalise some technological competencies that circumvented the traditional SI providers, storing the most sensitive types of data on the SV platforms themselves. Every further adoption of data science and AI in government entrenches further the influence of SV platforms. During the Covid 19 pandemic from 2020, many governments worked co-operatively with Apple and Google to operationalize anonymized Covid-tracking and notifications of infection risk, using smartphones. Public agencies adopted WFH (working from home) technologies, such as Google Meet and MS Teams, with enthusiasm. The cumulative entrenchment of SV firms in government is now evidenced at the highest levels, with Eric Schmidt (former CEO of Google) in particular described as an 'indispensable advisor to government' (Schmidt & Edgerton, 2023). The UK global AI Safety Summit in November 2023 was attended by the leaders of all the most prominent SV firms. A symbolic photograph of the crucial second day, attended only by the most influential decision-makers, shows the SV elite (including Elon Musk, Sam Altman, Reid Hoffman and Eric Schmidt) outnumbering heads of state and policy-makers.

Going forward, SV technologies will drive change in digital government. Generative AI (through LLMs) has many potential uses across all sectors, and public sector professionals are already using LLMs widely, albeit in an

unguided way (Bright et al., 2024). Opportunities, and risks, will be shaped by how SV firms develop LLMs. OpenAI, the creator of Chat GPT, was initially funded collectively by SV 'nobility', including Elon Musk, Reid Hoffman (founder of LinkedIn), AWS and Peter Thiel. Its rapid growth in scale and scope was funded by Microsoft ($13 billion), in large part to accommodate the huge costs of cloud and the computing required to train these 'foundation' models. Open AI's release of ChatGPT without warning, and without guardrails, in 2023 had major implications for every area of government and regulation, from educational assessment to the operation of elections. Likewise, any new development in accounting systems is likely to be driven from these firms. As generative AI is progressively incorporated across ERP systems (Lawton, 2023), developments and trends in accounting and financial management will be shaped by the changing nature and capability of LLMs such as GPT, Gemini (Google), LLaMA (Meta) and competitors that will inevitably emerge.

Conclusion

Policy and administrative elites have converted to the importance and centrality of digital, data-intensive modernization, with strong implications for public sector managers and accountants in particular (Agostino, Bracci, et al., 2022). There is now no part of government financial management, government activity, regulatory enforcement or service delivery that is not extensively conditioned by digitization and data-driven technological development (Agostino, Saliterer, et al., 2022). The political economy of government modernization is likely to develop on two tracks, powerfully shaping what happens next:

- On one track, the influence of and reliance on SIs will remain. Their power has been eroded through the move to cloud and AI, but they will remain embedded in digital government until legacy systems are fully replaced, with all the accountability issues and constraints on innovation that these systems entail.
- On the second track, the SV platform firms will shape every other aspect of government's relationship with data-intensive technologies in the next decade. With earlier generations of technology (legacy systems, front-end websites and online transactional services) government organizations continued in stasis with their SI partners, accepting highly intermediated versions of technological innovation. But with the current generation of data-driven technologies, governments will be directly exposed to buffeting winds of change driven by SV firms. Increasingly, policy, administrative, financial, and regulatory decisions—indeed, governments' capacity to govern—will depend in part on the capacity of administrative elites to understand and deploy these technologies and manage their political economy relationships with the technology industry.

The evidence we have presented in this article suggests that, as well as policy-making elites, researchers in public management should also focus on the political economy of digital government. Although work on digital government grew gradually into a body of scholarship by the early 2000s, the massive SI partnerships generated remarkably little scholarly attention (see Dunleavy et al., 2006a). The latest generation of AI technologies are generating a new literature on AI and 'algorithmic government' (see Straub et al., 2023, for a review) but, once again, the potential role of SV firms in shaping the future of government seems unexplored.

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