

# Digital transformation: The case for enterprise architecture in the local government sector

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## Abstract

*Local government in Australia aims to maximise the creation of public value for local communities through the provision of public services and infrastructure. In recent years, there has been an increased focus on digitising services and operations, which has only been catalysed by the COVID-19 pandemic. Local councils are now seeking more innovative and transformative ways to use information and communication technologies (ICTs). An Enterprise Architecture (EA) approach towards digital transformation offers organisations a vision and roadmap to achieve a future state ICT landscape that aligns with their goals and strategies. Local government may also derive significant value from the adoption of EA. Hence, this paper poses the question: **How can enterprise architecture support digital transformation in local government?** To address this question, 6 key capability areas of local government digital transformation were identified by reviewing initiatives and principles in publicly available Victorian council digital and ICT strategies. EA literature was reviewed to evaluate how EA can support these areas in order to establish the value proposition of EA for digital transformation in Australian local government. This paper finds that the implementation of EA provides benefits to support councils' digital transformation strategies. With a lack of empirical evidence in literature, we present a foundational, theoretical understanding on a very timely concern, that aims to stimulate further research and interest among academia and industry practitioners.*

## 1. Introduction

Digital transformation has been fundamental to the strategic journeys of Australian local governments (also referred to as councils, shires or municipalities) in recent years (Jones & McIntosh, 2019). As public sector organisations, their fundamental purpose is the delivery of public value, thus efficiency and customer-centricity are paramount (Twizeyimana & Andersson, 2019). There is a strong and growing appetite for change: councils are seeking new opportunities to meet the evolving expectations of their constituents (Jones & McIntosh, 2019). Evidently, the COVID-19 pandemic has only catalysed this digitisation, with councils moving rapidly to shift the way services are provided to communities and how their workforces operate (Jones et al., 2021). The need to enable these necessary shifts, have made the case for digitisation even more compelling.

Notably, a paradigm shift from 'e-government' towards more modernised and transformative 'digital government' initiatives necessitates an integrated, agile information systems environment; one which is supported by enterprise-wide capabilities in people, process and technology (Jones & McIntosh, 2019; OECD & IDB, 2016). As new digital innovations are strategised, there are profound questions as to how local councils can realise the full benefits to maximise the creation of public value.

Enterprise Architecture (EA) presents itself as a well-established approach to integrate processes, information technology (IT) and business capabilities to deliver organisational value (Niemi & Pekkola, 2020). In navigating this digital transformation paradigm, local council entities may derive significant value from the adoption of EA. Despite

growing research establishing the connection between EA and digital transformation, and equally, that which discusses digital transformation in local government, there is limited research combining these, particularly in an Australian context. Comparatively, subnational government revenue in Australia contributes significantly to GDP, thus a critical component of the economy (OECD, 2016). Hence, this paper aims to explore the benefits of EA for local councils by addressing the research question: *How can enterprise architecture support digital transformation in local government?*

This paper will first examine the key capability areas underpinning local government digital transformation by analysing the strategic plans of Victorian councils. By aligning these with the affordances of EA, we aim to demonstrate the value proposition of EA for digital transformation in local government.

## 2. Current State of Local Government

This section aims to contextualise the Australian local government landscape and the growing appetite for digital change. Principally, it discusses the key priority areas councils seek to address in their digital transformation strategies, which will serve as the baseline for evaluating the value of EA in Section 3.

### 2.1. The Australian Local Government Landscape

Three independent, and democratically elected levels of government (federal, state/territory, and local) work together to provide services for the Australian people (Parliamentary Education Office [PEO], 2021). Local governments, the third tier of Australia's federal democracy, are bound by state Acts which dictate their operating laws and parameters (PEO, 2021). They retain a degree of control and authority for the creation of by-laws regarding local matters and are responsible for the provision of extensive public services within their jurisdictions (Grant & Drew, 2017). These services include, but are not limited to, the development and maintenance of local infrastructure (roads, footpaths, community buildings, sporting facilities etc.), regulation (local laws, planning, inspections etc.), management and provision of arts and cultural facilities and events, a myriad of shared public services and policy management to ensure the ongoing wellbeing of local communities (Australian Local Government Association, 2020; Megarrity, 2011). With over 500 unique jurisdictions in Australia, councils are also tasked with engaging the communities they serve to develop a community vision that feeds into their service planning and council strategies (The State Government of Victoria, 2021).

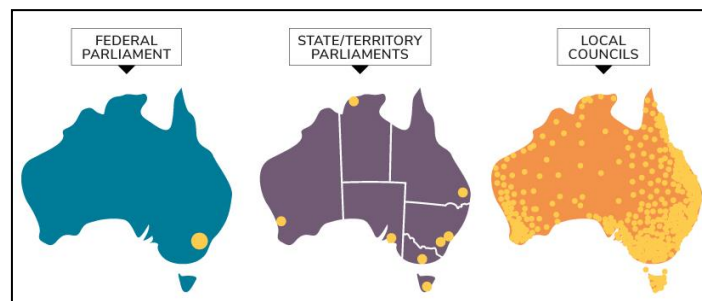


Figure 1. Three tiers of government in Australia (PEO, 2021)

Due to the number of constituents these services cover, increasing pressures for community development, and the need to reach larger geographical areas, councils have shifted to an 'e-government' model to ensure ongoing engagement and relationships (Fan, 2018a). The implementation of e-government, defined as "the use of information and communication technologies to support public services, government administration, democratic processes and relationships among citizens, civil society, the private sector and the state" (Dawes, 2008, p. 86), enables streamlined data processing, shared data and improved communication and transactional processes (Twizeyimana & Andersson, 2019). As in other developed countries, e-government is well-established in Australia as a means to create public value through improved operational efficiency and improved quality of, and access to, services for citizens (Meyerhoff Nielsen & Jordanoski, 2020; Twizeyimana & Andersson, 2019).

## 2.2. Digital Disruptions in Local Government

The maturation of digital technologies in recent years is announcing a paradigm shift from e-government to ‘digital government’ (OECD & IDB, 2016). Though often used interchangeably, digital government refers to transformation and innovation using modern information and communication technologies (ICTs), and the generation of new digital capabilities (Fan, 2018b). As ‘efficiency’ is being replaced with ‘innovation’ – which has been largely powered by private enterprise – local governments are harnessing this new conception of ICTs as a focal element of organisational transformation (Digital Transformation Agency, 2018; Janowski, 2015; OECD & IDB, 2016).

A more connected and informed customer base compels local councils to reimagine how they operate; to develop innovative and collaborative ways to meet their rising expectations (Jones & McIntosh, 2019). As customer-centricity – a customer first approach towards everything – is unequivocally the heart of local council, this is the fundamental driver of digital transformation (Jones et al., 2021). However, the innovation of ‘front-end’ platforms and services requires a highly integrated information systems environment to enable it; one which supports the consistency, availability and shareability of data through interoperable and connected systems (Forsyth, 2021). Evidently, digital government requires a transformational approach to enable seamless information exchange and system connectivity. The subsequent gains in operational efficiency serve to lower costs; allowing councils to redirect their resources to value-added services, thereby delivering more value to constituents (de Mello & Ter-Minassian, 2020).

The challenges of the COVID-19 pandemic have further spurred local councils to look beyond e-government initiatives as remote working conditions and growing customer preferences for online services have garnered significant traction (Jones et al., 2021). Hence, while there has been appetite for digitisation initiatives in the past, the case for evolution is now more pressing than ever (Jones et al., 2021).

## 2.3. Priority Capability Areas for Digital Transformation

Digital transformation is a widely used term and is broad in scope. In order to evaluate how EA can facilitate council digital transformation, an understanding of the foci is required. Like private enterprises, councils capture and update their intentions regarding digital transformation within a digital or ICT strategic plan. Through an analysis of these plans, we ascertain the priority capability areas for council digital transformation.

Given the similarities in organisational structure, powers, functions and services administered across states (PEO, 2021), we have limited the scope of our analysis to Victorian councils, of which 14 have a publicly accessible digital or ICT plan. Our analysis reveals six common, recurrent themes (summarised in Table 1) that represent the strategic capability areas councils are prioritising in their digital transformations: data analytics, system integration and mobility, council collaboration and shared services, emerging technologies, digital channels and services, and data sharing and availability.

*Table 1. Priority capability areas identified in Victorian council strategic plans*

Council	Data analytics	System integration & mobility	Council collaboration & shared services	Emerging technologies	Digital channels & accessibility	Data sharing & availability
City of Ballarat (2016)	X	X	X	X	X	
Baw Baw Shire Council (2018)	X	X		X	X	
Bayside City Council (2018)	X	X			X	
City of Boroondara (2019)		X		X	X	X
City of Casey (2015)		X		X	X	
City of Greater Dandenong (2020)		X	X	X	X	X
Darebin City Council (2017)		X		X	X	
City of Greater Geelong (2015)	X	X	X	X	X	X
Glenelg Shire Council & Southern Grampians Shire Council (2016)			X	X	X	
Hobsons Bay City Council (2018)	X		X	X	X	X
Mansfield Shire Council (2020)		X	X		X	X
City of Melton (2016)		X			X	
Whitehorse City Council (2020)	X	X		X	X	X

While our analysis is based on generic digital or ICT plans that capture the broad intentions of councils, several more digitally mature councils have devised strategies pertaining to specific digital initiatives, such as smart city strategies. As our focus is on digital transformation more broadly, these strategies are deemed out-of-scope for our analysis.

These capability areas are largely aligned with results from a recent study of Australian council digital transformation conducted by KPMG in collaboration with the Public Sector Network (Jones et al., 2021); suggesting these focus areas are key for councils moving forward.

### **2.3.1. Data Analytics**

Strategic plans often refer to data analytics alongside building intelligence capabilities for holistic decision-making. Data is being generated continuously, whether from online site visits, or through council services (waste management, closed-circuit television, parking meters, etc.) (Watson & Ryan, 2020). Councils intending to leverage data analytics note its value in developing customer-centric services and improving service delivery. In addition, Watson & Ryan (2020) propose a big data analytics approach could improve operational and planning efficiency, which coincides with growing industry sentiments that a rigorous data strategy can aid “future asset planning and management, and alignment to long-term financial goals” (Jones et al., 2021, para. 6).

### **2.3.2. Systems Integration & Mobility**

Most councils express an inherent need for systems integration and greater mobility from an organisational agility perspective. The COVID-19 pandemic has augmented the need for an ICT environment that supports remote working and the expectations of constituents for personalised, intuitive, and readily available services (Jones et al., 2021). With ageing legacy systems, councils require agile systems that can be readily upscaled upon demand; many seeking to leverage cloud computing (Ott et al., 2018). Better connected systems resolve back-end data silos and allow for a well-integrated information ecosystem, through which councils can generate organisation-wide efficiencies and offer more seamless customer-centric services (Jones & Low, 2021).

### **2.3.3. Council Collaborations & Shared Services**

Entering strategic, shared services arrangements with other councils aims to achieve economies of scale, particularly for regional and rural councils, or those that may not have the resources to undergo digitisation independently (Dollery et al., 2016). Collaboration is largely encouraged by the Victorian State Government as a way for eligible, participating councils to deliver better outcomes for *all* relevant communities. The government’s Rural Council Transformation Program provides grants towards the implementation of large-scale, transformative joint ventures, such as the implementation of centralised and standardised core information systems (The State Government of Victoria, 2018; Victorian Auditor-General’s Office, 2014).

### **2.3.4. Emerging Technologies**

The use of emerging technologies is central to the new ‘digital government’ conception (Fan, 2018b). Big data, internet of things (IoT), smart city approaches, and machine learning are all prominent avenues councils seek to explore. Furthermore, one of the councils analysed intends to generate novel ways of implementing augmented reality, wearables and blockchain technologies into their innovation ecosystem. The smart city movement, in particular, has gained significant prominence in recent years as urban planning faces new challenges in this modern age (Yigitcanlar & Kamruzzaman, 2018). A study by Yigitcanlar & Kamruzzaman (2018) illustrates that IoT technologies offer insights into the commuting patterns of civilians to derive more sustainable, yet targeted, policy making. Through increased information flows, councils can seek to be more responsive, sustainable and agile in the future (Jones et al., 2021).

### **2.3.5. Digital Channels & Accessibility**

All Victorian councils analysed acknowledge the need for enhanced digital channels, online customer interaction tools, and cloud-enabled self-service capabilities that can be accessed by personal mobile devices, anywhere at any time. However, data privacy remains a key challenge, as some have not opted for a ‘Digital by Default’ approach (the

aim to fully shift services online) (Janowski, 2015). Yet, councils could take inspiration from the Republic of Estonia, where mature digital literacy and heavy investments in ICT infrastructure have reduced reliance on legacy systems (Sorrell, 2015). With citizen buy-in and early capitalisation on technological trends, significant efficiencies and returns were made; savings of 2% of GDP (or €500 million) were attributed to digital signatures alone (Sorrell, 2015).

### **2.3.6. Data Sharing & Availability**

Victorian councils seek to consolidate data across business functions to enhance organisation-wide collaboration and information access. Data can be used as a single point of truth, thus reducing duplication and enabling more streamlined processes (Wiseman, 2020). Some councils also intend to develop open data platforms to partner with small and medium-sized enterprises or university researchers to develop joint capabilities. Maalsen et al. (2018, p. 72) note that a “well-established and high-performing Internet infrastructure drives business innovation and economic modernization” [sic] as the characteristics of community innovation is often driven by local entrepreneurs or private ventures. Furthermore, increasing data availability could enable greater community engagement and bring added confidence, quality and transparency to local councils for evidence-based decision-making efforts (Sivarajah et al., 2015).

## **3. The Enterprise Architecture Value Proposition**

This section will introduce the value proposition of EA and evaluate how its implementation can facilitate the capability areas discussed, which represent the fundamental elements of digital transformation for local government in Australia.

### **3.1. Enterprise Architecture**

EA is “the definition and representation of a high-level view of an enterprise’s business processes and IT systems, their interrelationships, and the extent to which these processes and systems are shared by different parts of the enterprise” (Tamm et al., 2011, p. 142). As such, it has been widely adapted as a planning and management tool in private enterprise, as both a process and a product aligning the organisation towards a common goal (Niemi & Pekkola, 2020). However, EA adoption in the local government sector has received limited attention in research, despite broader public sector analysis lending support to the benefits of EA in government organisations (Ask & Hedström, 2011; Dang & Pekkola, 2017; Seppänen et al., 2018).

Broadly, the implementation of EA is argued to deliver substantial value for organisations, though conclusive practical evidence remains limited (Alwadain, 2020; Tamm et al., 2011). Tamm et al. (2011) propose that a high-quality EA can deliver benefits for organisations by enabling organisational alignment, information availability, resource portfolio optimisation and resource complementarity. This relationship is represented in Figure 2. However, as EA offers a broad and varied approach with different, nuanced perspectives, there is a lack of consistency in the benefits of EA implementation across industries (Dang & Pekkola, 2017; Tamm et al., 2011).

Regarding digital transformation specifically, it is widely supported among information systems and management researchers that EA is a vital ingredient for organisations to drive digital transformations, given its ability to map out business and IT assets and their linkages, and enable agility (Gong et al., 2020; van de Wetering et al., 2021). Notably, Gartner’s Hype Cycle for Enterprise Architecture emphasises the increased importance of EA since the onset of the COVID-19 pandemic (Allega, 2020).

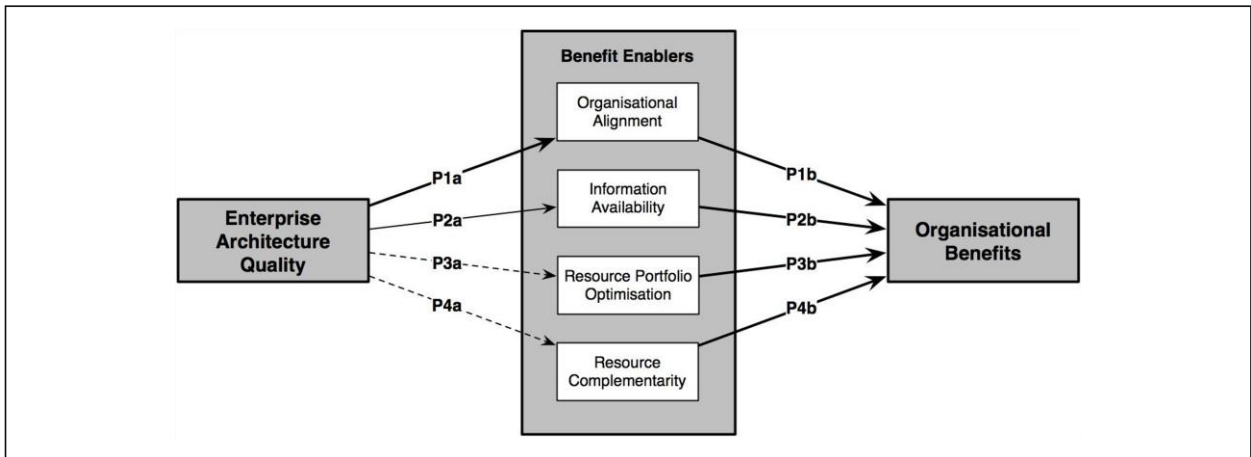


Figure 2. Enterprise Architecture Benefits Model (Tamm et al. 2011)

### 3.2. Enterprise Architecture for Digital Transformation in Local Government

To ascertain the value of EA for local government digital transformation, we seek to evaluate how its implementation can specifically support the six priority capability areas identified.

#### 3.2.1. Data Analytics

Challenges arising from the efficient and effective utilisation of data are mostly derived from fragmented legacy systems, privacy concerns, management capabilities, or internal processes (Gong & Janssen, 2021). Furthermore, as resources are limited, councils can benefit from a business intelligence framework for enhanced decision-making capabilities (Sun et al., 2016). Such prescription of data-related management practices throughout the ICT ecosystem and broader strategic policy of local government can be facilitated by EA and may lead to this desired level of intelligence (Janssen & Cresswell, 2005). TOGAF®, a widely used EA framework, largely supports the ideal that the development of a high-quality data architecture layer can help councils make effective use of their internal and external data (The Open Group, 2018). This layer, alongside addressing capability gaps within management, can guide local government throughout their transformation journeys, and foster a data-driven approach toward enhanced data analytics competencies (The Open Group, 2018; Wiseman, 2020).

#### 3.2.2. Systems Integration & Mobility

Improving system integration is considered a key benefit of EA implementation. Tamm et al. (2011, p. 148) establish that an operating platform (the IT systems and digital business processes in an organisation) that is guided by EA lends itself to “a higher level of standardisation and integration”. Through the development of a standardised architecture, EA improves information flows across the organisation, thereby minimising duplication of technologies and enhancing reuse (Ross & Westerman, 2004). In addition, the structure imposed by EA allows organisations to map out processes, technology and data to identify opportunities for system integration (Tamm et al., 2011).

Progressing from IT silos to an optimised IT core and ultimately towards business modularity is the essence of the commonly used EA maturity model, through which organisations transition to achieve their desired state of IT optimisation (Vessey & Ward, 2013). Enabling mobility through cloud computing can be achieved at maturity level 4 (the highest level), where cloud-based IT services can be modularised and reused, through a service-oriented architecture approach (Masuda et al., 2016).

#### 3.2.3. Council Collaborations & Shared Services

Developing synergies across local government can be both strengthened and leveraged with EA (Megaritty, 2011; Tamm et al. 2011). For a shared service future state to occur, the implementation of EA requires organisations to produce information pertinent to their individual systems, processes and data requirements for each party to integrate, which also facilitates transparency for collaborative strategic alignment (Tamm et al., 2011; Vargas et al., 2013).

Vargas et al. (2013) reinforces this concept, suggesting that organisations, such as local councils, can use EA as a tool to extend beyond individual boundaries to collectively optimise shared resources. Effectively, EA creates a solid foundation and understanding to reduce any potential complexities and can therefore be considered a vital asset to the instigation of shared services and synergies.

### **3.2.4. Emerging Technologies**

At first glance, the structure of EA could be seen as a deterrent to the adoption of emerging technologies, as a formalised structure and process may be perceived as detrimental to innovation. However, the use of EA to facilitate emerging technologies is perceived to be a critical component of achieving digital innovation and broader transformations (Rimol, 2021). Increasing the reliance and focus on digitisation, combined with desires to adopt new and emerging technologies inherently attracts increased complexity from enterprise IT systems (Bossert & Laartz, 2016). Managing this complexity in conjunction with the contextual and strategic aspects of the organisation in a transparent and universally understood manner is a challenge that can be addressed through the implementation of EA (Gill et al., 2011). Proposed as a key reason for implementation, the Government of Western Australia's (2017) EA Framework explicitly outlines the use of EA as a solution to monitoring and implementing emerging technologies within the public sector.

### **3.2.5. Digital Channels & Accessibility**

The strategic context and direction imposed by EA can be seen as an asset to the digitisation of local government services and their associated policy requirements (The Open Group, 2018). Given the implementation of digital channels in government has historically been considered a direct transition from offline to online (rather than a reconstruction of offline processes to better suit digital environments), the framework provided by EA may better position local government to accomplish this in a more timely and efficient manner (Gong et al., 2020). Eliminating the need for unnecessary and wasteful reconstruction of services once deployed, EA can be considered a resource saving asset and process to local government that also provides the monitoring, management, and policy required to maintain them at standards customers expect (Dang & Pekkola, 2017). Moreover, the inherently strategic nature and focus of EA may position councils to adopt digital channels and approaches to service accessibility more readily as technologies improve and develop in new and innovative areas (Saha, 2012).

### **3.2.6. Data Sharing & Availability**

Enabling organisation wide data sharing and availability across local government and the community necessitates an interoperable IT infrastructure that can be deployed with agility (Almeida et al., 2011; Gong et al., 2020). Hjort-Madsen (2006) note an EA approach, which offers both structure and direction, ultimately facilitates and ensures a single point of truth across multiple data stores. Moreover, as community data becomes an additional key input, "an operating platform guided by a high-quality EA is likely to improve information availability from the organisation's transactional and analytic data stores", which is necessary for community partnerships and investment (Tamm et al., 2011, p. 153). Particularly, as different business units of local government have the potential to produce exorbitant quantities of data, overcoming these complexities through EA can be of particular benefit. The clarity of the IT ecosystem gained through the prescription and documentation of the systems, processes, policies and standards provided by EA, local government may better manage interoperability of their IT systems, and therefore the ability to share and integrate data, both now and into the future (Etegan et al., 2010).

## **4. Discussion**

It is evident that EA offers assistive attributes to support the specific capability areas of local council digital transformation, as discussed in Section 3.2. The structure and direction that EA provides, and the ability to manage complexity by offering a clear view of the organisation's processes, systems and data – and their interrelationships – underpin the case for EA across these capability areas. Therefore, EA can be considered holistically as a facilitator of digital transformation initiatives in local government.

Moreover, it must be noted that the EA value proposition is not limited to the specific digital capabilities that councils aim to achieve in their transformations, but extends to the strategic efforts that form the preliminary basis of digital transformation. Korhonen and Halén (2017, p. 357) articulate that digital transformation is not a one-off

occurrence and that “adaptive capabilities and flexible structures should be systematically developed and managed”. Adaptive EA approaches have been shown to offer enterprises a faster, better and more innovative business model to quickly adjust to an exponentially digitised global economy (Zimmermann et al., 2018). Particularly, as councils navigate the ongoing impacts of the COVID-19 pandemic, and through today’s dynamic technological landscape, an adaptive EA could aid in identifying new opportunities and sustaining the resilience of their digitisation initiatives.

Furthermore, we acknowledge that, in general, a high-quality EA requires a significant investment of time and resources (Tamm et al., 2011). Yet, the circumstances for local government are inherently different, as the non-competitive nature of councils permits the formation of EA to be a collaborative journey. We recognise that this could be served well if councils garnered support from, and aligned with, state and federal levels of government, where EA policy and capabilities exist (Australian Government Information Management Office, 2011). Ultimately, by building upon a collective set of knowledge that can be utilised within and across councils, it will only serve to maximise the creation of public value across all levels of government.

## 5. Conclusion

In this digital government era, Australian local councils are uplifting their digital capabilities to meet the evolving needs of their constituents. We establish that the implementation of EA is a suitable and useful prerequisite to support the development of these key capability areas, alongside, more broadly, the strategic efforts fundamental to councils’ ongoing digital transformation journeys.

This conceptual paper can be considered foundational research on the benefits of EA implementation for digital transformation in local government. Importantly, it does not intend to offer implementation direction or propose EA frameworks to support implementation, but rather to demonstrate the case for EA and stimulate further research in this context. For example, further initiatives, such as adaptive EA, have been briefly discussed as an area of consideration as a council’s digital capabilities progress to the next level of maturity.

The literature review approach employed affords a theoretical perspective into answering the research question posed. However, minimal empirical evidence of the EA value proposition in local government proves this is an evolving concept, thus should be considered a key area for further research. Furthermore, this paper also has apparent practical implications for local government as further leadership from state governments (and other related municipal associations) can assist these entities to structure and organise their digitisation initiatives in an increasingly complex operating environment.

While the key capability areas identified from the plans of Victorian councils are generalised to represent the intentions of Australian councils more broadly, we acknowledge that specific nuances across different geographic and socio-economic contexts may have been missed. Nevertheless, we believe this conceptual paper highlights an evolving and timely concept given the increasing complexities arising from the COVID-19 pandemic, and is therefore likely to incite further interest among researchers and industry practitioners.

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