Enterprise Architecture Adoption in Government: A Public Value Perspective

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ABSTRACT

Substantial research has been conducted to investigate the value that Enterprise Architecture (EA) can generate for organizations. However, there is also a need to empirically explore the mechanisms involved in creating this value. Against this backdrop, this paper aims to answer the research question: "Which mechanisms contribute to generating value through using Enterprise Architecture in government?" The research was conducted through a survey administered to Swedish government organizations, directed by a public value framework. The data analysis was conducted using descriptive statistics and an inductive analysis of open-text answers. The findings reveal values associated with the use of EA in government and corresponding value-generating mechanisms. Core activities in the municipalities consist of establishing digital value chains where values are generated for citizens and the internal administration. National agencies engage more in creating strategic value through intrinsic enhancements enabled via EA to establish organizational commonalities. Our findings informed a conceptual framework, which encompasses organizing principles, core EA activities, and applications. This research contributes to the literature on the use of EA in government by highlighting EA activities related to the strategic orientation of organizational operations and enablers for deriving valuable results from these activities. Our framework, informed by theories of public value and results from practice, provides a roadmap for public managers to plan and operationalize their architectural work. By doing so, we contribute to establishing an important link between research on EA in the public sector and public value theory. We conclude the paper with suggesting additional research on two identified research gaps: 1. Using EA for participatory processes, 2. Further investigation of evaluation practices.

CCS CONCEPTS

• **Social and professional topics** → Professional topics; Management of computing and information systems; • **General and reference** → Document types; Surveys and overviews; • **Computer systems organization** → Architectures.

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1 INTRODUCTION

Enterprise Architecture (EA) has received attention among practitioners and academics since the 1980s [43]. The goal of EA is to align the structure of information systems with decision-making on business and strategic levels [51; 55]. In government practice and e-Government research, EA has commonly been associated with interoperability to achieve alignment between organizations and systems (e.g., [15]; [14]; [25]; [18] [54]). However, even though the EA approach has received general acceptance as a management approach and in academia, it has been subject to criticism. For example, it is noted that many EA projects have failed [39]. Moreover, the e-Government literature mentions several challenges for successful implementation in the public sector related to organizational, project, and user issues [6]. These include organizational resistance and lack of participation, the absence of clear goals, a lack of necessary skills [42], and ambiguities between different levels of government [27]. As noted by [17] EA in government is driven by fashion and cannot lead to transformational effects on its own.

While previous research proposes that EA generates value for organizations, scholars also call for additional investigations of the theoretical foundations and empirical validations for these claims [47]. The benefits of implementing EA in the public sector are difficult to demonstrate [42] and these benefits are indirect and depending on organizational capabilities [43]. As noted by [31; 30], the benefits of EA practice are extensively studied. However, a literature review on the topic of EA conducted by [13] revealed a lack of description of value-generating mechanisms of EA, which makes it difficult to establish what values are created by an organization that implements EA. The authors argued that there is a need for the value-generating mechanisms of EA implementations to be demystified and disclosed. However, research on the topic of EA in government is fragmented, which prevents the accumulation and diffusion of a best practice [8].

In this paper, we argue that the lack of research that associates value-generating mechanisms with EA is a significant shortcoming,

especially in the context of the public sector, where government organizations are accountable for how they spend fiscal funds. Against this backdrop, the purpose of this paper is to generate a greater understanding of how value can be created using EA in government. More specifically, we aim to answer the research question (RQ): "Which mechanisms contribute to generating value through using EA in government?"

To achieve this, we consulted government practitioners through a survey of Swedish municipalities and national agencies, which is further described in Section 4. First, related research is presented in Section 2, followed by a theoretical framework of public value in Section 3.

2 RELATED RESEARCH

In this section, we provide an overview of previous research, and a rationale for the use of a public value perspective to gain domain specific insights on the adoption of EA in the public sector.

EA is a holistic planning and control approach emphasizing that organizational resources such as people, knowledge, assets, projects, and processes should be combined and aligned to make the enterprise a coherent and efficient system [12; 46]. However, there is no commonly agreed definition of EA [28; 46; 55], and previous research mentions that organizations apply fundamentally different approaches to managing EA [22]. A plethora of diverse EA frameworks has been presented [41; 10], demonstrating differences in scope and focus. While the alignment of information systems with strategy and business remains central in the EA frameworks, contemporary EA has developed a broader perspective, with information systems as just one part of the complex whole [12; 46]. However, [24] stated that previous research on EA had adopted a "product view," and the author highlights the need for more dynamic views. In this paper, we argue that the notion of public value constitutes one such view. The generation of value from EA depends on several complementary processes [1]. These findings indicate that EA does not generate any benefits on its own but is dependent on contextual factors. Management of institutional factors such as trust and participation plays a key role here [2]. If properly managed, EAM (Enterprise Architecture Management) research suggests that EA may reduce the complexity often associated with modern IT infrastructure [3]. Here, researchers mention the importance of top management commitment, active involvement from the organization's departments, and to being able to show the value of EA to stakeholders [37]. However, the management of EA needs to be tailored to an organization's specific conditions [20]. Hence, researchers face a challenge to accumulate knowledge that may be relevant for several different organizational entities. Here we argue that the public sector constitutes an interesting exemplar as many government organizations work under similar organizational conditions and common legal frameworks, even though they enjoy a certain autonomy towards central government. These organizations also share a common value-landscape where managers seek to provide means to create public value for civil society [32, 33], see also [40].

Previous research highlights how the transformational effects of EA, are dependent on the institutional forces in an organization [18]. Similar concerns were raised by [9], who described how institutionalization affected the outcomes of EA implementation in two organizations (see also [52; 21]). Niemi and Pekkola [35] proposed a model for EA benefit realization based on interviews with a large Finnish public organization. Niemi and Pekkola [36] also highlighted the challenges of measuring EA benefits within traditional one-year budget cycles. These authors depict EA as a patience game where process and quality measures can be used to track the trajectory of EA in an organization over time. However, as [38] noted, a clear understanding of what constitutes value is a pressing issue when determining the benefits of EA. It is noteworthy that while several studies focus on the potential benefits of EA in the public sector, few consider the unique value landscape of this sector. To address this shortcoming, this paper addresses the notion of "public value." This approach has several advantages. First, public value is specific to the public sector, and hence we avoid the mistake of studying public organizations by adapting views from the private sector. Second, by positioning our study of EA within public value theory, our paper contributes with an important integration of two strands of e-Government literature.

3 THEORETICAL FRAMEWORK: PUBLIC VALUE AND VALUE-GENERATING MECHANISMS IN GOVERNMENT

Values are fundamental to everything we do and are an underlying force in decision-making [26]. Investigating how governments can create value through digital technology is an important dimension of research on public sector digitalization [29]. To build a conceptual foundation for the survey with the aim of identifying value-generating mechanisms, we used a public value framework established in previous research. As noted by [4, p. 83], a mechanism "is a causal structure that explains an empirical outcome". Public value focuses on the benefits (outcomes) produced by governments for internal and external stakeholders ([15]; [5]; [32], [33]). As noted by [23], government architecture may be seen as a driver for public value. Essentially, public value is created within "the strategic triangle" where managers conduct activities to a) create value for civil society, b) ensure these activities are feasible within the operational capacity of the public administration, and c) legitimize the action through support from the political sphere [32, pp. 22-23].

This study is positioned in the context of public value established by [32] to examine value-generating mechanisms. To do so, we adopt a model proposed by [16], who specifically mentioned value-generating mechanisms in a framework based on public value. These authors further detailed out public value theory and proposed several value impacts and asserted that value is produced by "value-generating mechanisms." According to [16, p. 91], "identifying these mechanisms allows us to specify the means, or pathways, by which a government action may be related to the production of one or more public values." The authors mention six such mechanisms: efficiency, effectiveness, intrinsic enhancements, transparency, participation, and collaboration. These mechanisms can be divided into external and internal views where management perspectives are differentiated from service delivery perspectives (see, [34; 51]), as summarized in Table 1.

Connecting a type of value with a value-generating mechanism reveals how a government program is expected to "produce" value.

Table 1: Public Value Framework

Value-Generating Mechanism	Description
Efficiency	Concentrates on the ratio of outputs generated to resources invested in terms of workloads, activities, and processes inside a public organization and / or its service delivery to citizens.
Effectiveness	Concentrates on the quality of internal management and services delivered to citizens by government organizations.
Intrinsic enhancements	Concentrates on the changing environment or circumstances for governmental or non-governmental stakeholders.
Transparency	Concentrates on transparency in various processes through information sharing and integration across government organizations and accessibility of information and decision-making processes related to service provision and delivery.
Participation	Concentrates on the frequency and intensity of direct involvement of internal and external stakeholders in decision-making or operation of government.
Collaboration	Concentrates on collaboration between governmental and non-governmental actors.

Table 2: Organizations that work holistically with EA.

Organization type	Count
Municipality	13 (12.4%)
National agency	34 (29.6%)
Total	47 (21.4% of sample)

Harrison et al. [16] describe a sequential approach for public value assessment in their framework, namely: Describe initiative - Identify stakeholders - Identify the public value - Identify mechanisms of change - Summarize the public value assessment. These steps were used in the survey detailed in this paper, and operationalization of the public value framework is further described in the following section.

4 MATERIALS AND METHODS

The survey was sent to the official email addresses of the Swedish municipalities and national agencies. Background questions concerned the role of the respondent in the organization (open question), sex (male, female, other), and type of organization (municipality, national agency). To determine organization size, population was used for the municipalities and number of employees for the national agencies (these are commonplace measures to assess the size of Swedish public organizations [48].

The survey generated a sample of 220 answers, 105 municipalities, and 115 national agencies, representing 41.5% of the total statistical population (36.2% of the municipalities and 47.9% of the national agencies.) The respondents were 75 women, 144 men, and one non-binary. Participants had a variety of roles, often managerial, the commonest being IT-function (non-architect) (87), architect function (40), digitalization function (25), organization developer/strategist (15), administrative function (14), manager in other areas (22), and other roles (17).

Since we wanted to include organizations that worked holistically with EA (e.g., not individual projects or partial initiatives), the first question was, "Does your organization actively work in a holistic manner with EA (for example, through a dedicated organizational unit, or through using EA frameworks)?" The survey continued for respondents who answered "yes" to this question and ended for those who answered "no." The rationale for this initial selection was to ensure the respondents represented an organization with a strong emphasis on EA in contrast to conducting related activities such as process modelling (which occurs in most public organizations). As seen in Table 2, 47 respondents answered that their organizations worked holistically with EA.

The respondents were then asked if they could select an initiative (e.g., activity, project, or similar) related to the organization's work with EA that had generated value. The survey continued for the respondents who answered "yes." At this stage, the public value framework was operationalized with further questions about the respondents' chosen initiative. These questions are described in Table 3. The survey concluded with the question: "How have you evaluated the values generated by the initiative?" Figure 1 shows the flow of the survey together with the number of respondents left at each step.

In this study, the data consists of answers to open survey questions, where the respondent's answers are not limited to a set of predefined response options [45] to elicit narrative responses [6]. Using open questions in surveys has several advantages, including achieving respondent-focused surveys, eliciting explanations that aid in interpreting motivations, and achieving the same breadth and representative coverage as quantitative surveys. Since the studied phenomenon is characterized by conceptual vagueness, another advantage of open questions is that they capture a broad range of possible responses compared to surveys with predefined answers [45].

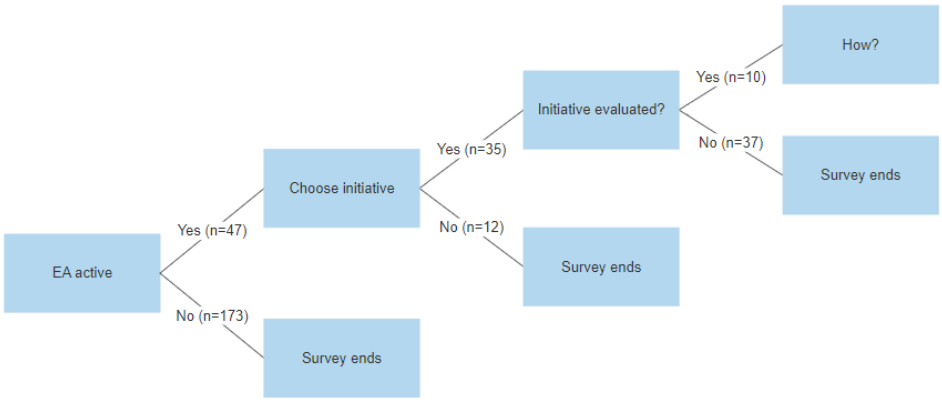

Figure 1: Flowchart of the survey.

Table 3: Operationalization of the public value framework

Construct	Operationalization
Describe initiative	Describe the chosen initiative briefly.
Identify stakeholders.	For which stakeholders has this initiative generated value?
Identify the public value.	What type(s) of value(s) were generated by this initiative?
Identify mechanisms of change.	Describe the mechanisms, events, and activities that have generated value in the initiative as in-depth as possible.
Summarize the public value assessment.	Has the initiative been evaluated, and if yes, how?

4.1 ANALYSIS

The data analysis used descriptive statistics and inductive coding of the open-text answers. Descriptive statistics were used to describe "how many" to provide an overview of—for example, how frequent a certain value generating mechanism was mentioned in the materials, and how many organizations had evaluated their EA initiatives. To guide the analysis and focus on value-generating mechanisms, the answers to the survey's open-ended questions were subject to inductive coding based on the Gioia methodology [11]. In line with this methodology, we treated the survey respondents as "knowledgeable agents" who possess important information about what their organizations are trying to achieve. The researchers' role is to ascertain patterns in the data to surface concepts and relationships and aggregate the results into theoretical constructs as a basis for advancing knowledge on a topic. While the Gioia methodology rests on assumptions associated with grounded theory, we recognize that researchers are sensitized to their background knowledge and theoretical predispositions [49]. In this research, we used public value theory as a framework to inform our coding. Hence, we acknowledge that our coding is informed by the value-generating mechanisms presented in Section 3, and open to new, inductively-generated constructs.

We performed the coding in the Atlas.ti software to aggregate the open-text answers. Following the Gioia methodology [11], we generated themes based on first-order codes from the open-text answers. These themes were then aggregated to form aggregated constructs. This process enabled the creation of a conceptual framework of value-generating mechanisms associated with EA on three different levels based on the aggregated constructs: "organizing principles," "core EA activities," and "applications." Here, the public value framework was operationalized to outline the types of values generated at each stage of our framework.

5 RESULTS

The findings are presented in two parts. After an initial description of the sample, Subsection 5.1 proceeds with information on how the respondents from the municipalities and national agencies describe value-generating mechanisms related to their use of EA. Subsection 5.2 presents details of whether and how organizations evaluate the value of EA. Among the 47 organizations mentioned in the previous section, eight municipalities and 27 national agencies provided information about initiatives related to the use of EA.

5.1 Value-generating mechanisms

Respondents from both types of organizations highlighted how they systematically structure work processes while anchoring the work with EA with top management. Examples of such activities include strategic planning, centralizing EA governance, and workshops with relevant stakeholders to achieve the consolidation needed to undertake EA activities.

The respondents from the municipalities emphasized using process mapping to outline the events occurring in interactions between citizens and the organization. The mapping is then used as a foundation for digitizing the processes, which involve the design of e-services published on the municipalities' websites, which informs the internal administrative systems. Examples of such

e-services mentioned by the respondents include administering mooring (spots for tying up boats), arranging the vaccination of children by school nurses, digitizing building permits, and two instances of implementing general-purpose e-service platforms. These e-services are expected to contribute value through internal and external effectiveness and efficiency, as they make it easier for citizens to perform tasks online while automating task-handling for administrative staff.

"We have worked with a concept where we use service design and user stories to perform process mappings and solutions designed on common platforms" - Respondent, municipality.

The municipal respondents also mentioned three solely internal cases, including the creation of a common platform for staff education, an automated onboarding process for new employees, and an update of the organization's model for system management. The respondents emphasized the anchoring of these activities throughout the organization via governance and standardization to consolidate stakeholders' perceptions. Suboptimized processes are identified and revised through the process mapping, since the events and involved actors are unveiled as the processes become more transparent. The respondents emphasized the role of "clarity" as the properties of their organizations are outlined, which in turn empowers them to pursue relevant activities as a result of unified processes. In cases where the processes involve external stakeholders, improved external quality (effectiveness) is also mentioned. These activities are also used to increase efficiency through simplifications and streamlining of processes, which generates value for internal and external stakeholders. One example is the digitization of signatures, which a respondent highlighted as especially useful during the COVID-19 pandemic for employees and customers communicating remotely. These activities are also associated with a rationalization logic, where standardization and centralization are mentioned as providing economic value.

The respondents from the national agencies also engage in process mapping, but the initiative focuses mainly on creating commonalities such as IT objects, templates, model libraries, metadata for the organization's open data, project models, business capabilities mapping, and research infrastructure management. To construct such commonalities, the national agencies engage in activities related to systematization and standardization, in combination with EA governance, which eventually leads to the consolidation required for generating the commonalities.

"By describing the information that the agency needs to manage we have generated a common "map" that unifies operations and IT" - Respondent, national agency.

The processes and commonalities form intrinsic enhancements that, if not subject to additional enablers, are largely stakeholder agnostic until they are set into context. This stakeholder agnosticism is evident in the respondents' answers to who these enhancements provide value for, as the responses do not indicate any specific group but refer to "the whole organization" or "the agency and our customers" (several respondents referred to the citizens as customers in the survey). While the respondents often treat these commonalities as agnostic, they may also be used to generate (unspecified) value for external stakeholders—for example, open data published in the wake of standardization of meta-data may be reused by external stakeholders. Other examples of commonalities include IT objects, standardization through common templates and organizational maps.

Table 4: Distribution of value-generating mechanisms (note: one respondent can refer to more than one mechanism).

Mechanism	Count
Efficiency	20
Effectiveness	17
Intrinsic enhancements	14
Transparency	9
Collaboration	2
Participation	0
Total	62

The respondents highlighted two common applications that generate public value: service design and reuse. As aforementioned earlier in this subsection, the creation of e-services generates internal and external efficiency and effectiveness when processes are optimized and digitized. Meanwhile, when commonalities are subject to reuse within the organization or by external stakeholders, they lead to increased effectiveness in terms of quality and increased security as the organization gains more control over its entities.

The distribution of value-generating mechanisms mentioned in the materials are summarized in Table 4. As seen, efficiency, effectiveness and intrinsic enhancements followed by transparency are the most common mechanisms, while values related to collaboration and participation are sparser.

5.2 Evaluation

Only ten informants (3 from the municipalities and 7 from the national agencies) answered "yes" to the question of whether they had evaluated the initiative. Thus, the survey answers suggest a lack of evaluation methods for assessing the value of EA. The municipality respondents mentioned that they conduct evaluation "only on a highly qualitative level," "through coordination on a website," and as "work in progress to generate evaluation variables for our system management model." The national agencies referred to "legal compliances and time savings," "continuous and systematic evaluation of predefined [unknown] criteria," evaluation of [unknown] project goals," a description of results rather than evaluation practices, difficulties in generating key performance indicators, and checks for whether a solution can be reused. While the respondents also mentioned that the use of EA contributes to improved decision-making and evaluation, they simultaneously depicted a situation where evaluation practices to ascertain the value from EA remain nascent.

The coding of the open-text survey answers led to the creation of nine themes and three aggregated constructs, as illustrated in Table 5. These constructs are further discussed in the following section.

6 DISCUSSION

The analysis informed the creation of a conceptual framework, as illustrated in Figure 2. The framework shows the three-stage value-creation process of EA in government: establishing organizing

Table 5: Results of the coding

1st order codes	2nd order themes	Aggregated constructs
Structured, step-wise implementation of EA. Structured stakeholder inclusion.	Systematization	Organizing principles
Establishment of best practices.		
Standardization of methods and concepts.	Standardization	
Standardized template for metadata.		
Anchoring of EA work with top governance.	Governance	
Identifying common challenges via an intra-organizational digitization council.		
Transition to a more centralized form of governance.		
Moving EA function from IT department to a central organization unit.		
Strategic directions for EA.		
Solution mapping.	Process mappings	Core EA activities.
Information mapping.		
Overviews of processes and actors.		
Process modeling by default in all projects.		
Process mapping workshops.		
Identification of suboptimized processes.		
Transparency in processes.		
Workshops with key stakeholders to pursue consensus.	Consolidation	
Interviews with employees to generate an information model.		
Educational efforts and continuous dialogue within the organization.		
Organizational empowerment through clarity.		
Creation of a common model library.	Creating commonalities	
Creation of IT objects.		
Creation of metadata.		
Creation of templates.		
Working with user stories.	Service design	Applications
Creation of e-services.		
Increased quality for citizens.		
Reduced administrative work.		
Use of common digital platforms.	Digitization	
Digitization of processes.		
Transition to digital signatures.		
Using digital value chains to enable internal and external efficiency and effectiveness.		
Using and reusing created commonalities.	Reuse	
Reusing objects from other organizations.		
Increased efficiency through reduced redundancy		

principles, undertaking core EA activities, and creating enabling applications. Each stage is associated with different tasks and value-generating mechanisms.

The highest level of the framework consists of organizing principles that act as a foundation for further EA work. These principles revolve around forming systematic ways to work, such as standardizing activities and establishing governance functions. At this point, no values are generated, as the principles act as strategic prerequisites necessary to undertake EA activities. As this level rely on effective governance and strategic management, the commitment from political leaders and top management is crucial at this step, to achieve sustainable and robust foundations for further work with EA (see, [37].

The role of consolidation is highlighted in the middle level of the framework since it was heavily emphasized by the respondents, as revealed during the inductive coding. By engaging with stakeholders in the organization, consolidation regarding key terms and processes was achieved, which allowed the undertaking of "core EA activities", the mapping of key processes, and the creation of commonalities (IT objects, templates, etc.). These activities highlight the sociotechnical nature of EA work [24] as actors converge to provide intrinsic enhancements and transparency [16]. Through consolidation, individual knowledge is merged to empower the organization

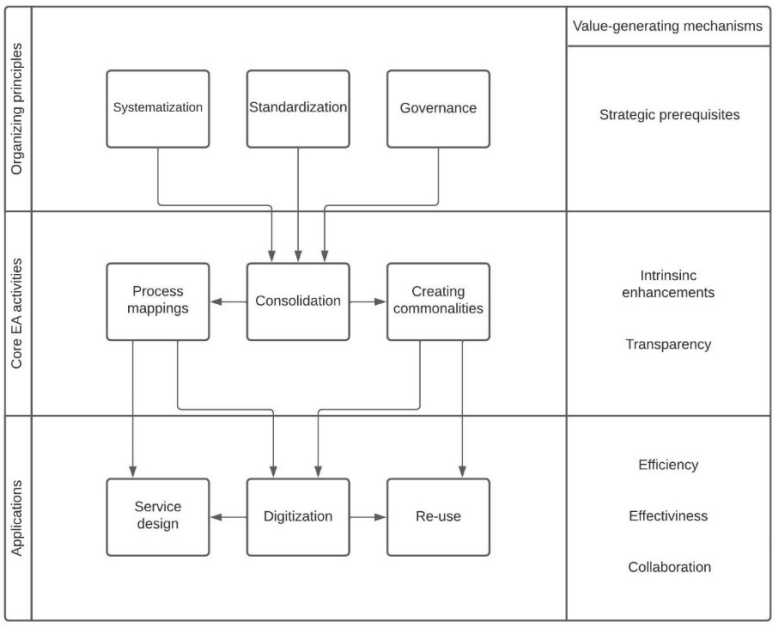

Figure 2: A conceptual framework of value-generating mechanisms for Enterprise Architecture in government.

and contribute with vital information about suboptimized processes and gaps that stem from a lack of common concepts. The value-generating mechanisms at this stage remain largely agnostic since they are not tied to specific applications yet. Hence, from a public value perspective, EA work at this stage consists of creating feasibility [32] for value-creation.

At the lowest level of the framework, "applications" facilitate the creation of public value to the organization's internal and external stakeholders. Service design activities generate value for external stakeholders while improving administrative tasks and enhancing the interactions between citizens and public servants, and the reuse of commonalities enables more efficient work practices (see, [43]). At this stage, digitization plays a key role, and digital value chains enable the creation of e-services while digital objects are made available for reuse by relevant stakeholders. Here, organizations advance in the strategic triangle proposed by [32] to create value for civil society.

In line with previous research [55], we identified multiple approaches to EA in the public sector. Our results reveal that municipalities engage more in the digitization of processes while national agencies emphasize the creation of commonalities available for reuse for the whole organization. These activities are accounted for in our integrative framework, which encompasses public managers' orientation toward reliable control of organizational operations and the need to gain valuable results from these activities [32, p. 17]. The strength of our framework lies in its integrative nature that links the authorizing environment's (politics and top management) role in providing legitimacy and support to enable operational capabilities in the organization, which are then used to produce public value. Here, our study adds an important dimension to the value-generating mechanisms proposed by [16], namely strategic prerequisites. Taken together, our framework highlights how EA is dependent on strategic efforts in an organization, to achieve a common repertoire where previous fragmented knowledge is consolidated to inform the creation of digital artifacts. The sociotechnical nature of this process should not be underestimated, especially in local government where many organizations are decentralized and divided into numerous areas of responsibility. Nevertheless, our proposed framework is general enough to be translated in domains beyond the public sector as well.

Meanwhile, our findings suggest ascertaining the value of EA remains elusive, and evaluating the EA work is difficult due to the agnostic nature of many activities, and the dependency on organizational and contextual factors. However, given the need to seek political support to legitimize large undertakings in the public sector, we recommend further research into methods for evaluating EA. The lack of participatory and collaborative values related to external stakeholders is another potentially troublesome finding that requires future research.

7 CONCLUSION

This paper addresses the RQ: "Which mechanisms contribute to generating value through using EA in government?" Via a conceptual framework, the paper contributes to current research by highlighting how activities related to EA range from organizing principles to core EA activities and applications. By utilizing a public value perspective, we differentiate between two modes of EA: first, EA as strategic work where stakeholder-agnostic intrinsic enhancements provide organizations with the necessary foundations relevant for

making the pursuit of value-generating activities feasible; and second, EA in use, where organizations reuse commonalities, digitize processes, and create e-services to facilitate interactions between stakeholders, which in turn enable efficiency, effectiveness, and collaboration. Our framework, informed by government practice, serves two crucial functions. First, it establishes a critical link between research on EA in the public sector and public value theory. Second, the framework is sufficiently distinct to serve as a basis for managers planning and operationalizing their architectural work.

This research was not without limitations. We relied on a self-assessment survey in a specific national context, and the respondents in a coordinating position are likely to have a positive view of EA. A limitation of the methodological approach is that concepts in open text are not always sufficiently distinct to be easily categorized into a specific code. However, we argue that this is an acceptable trade-off given the richness of the material provided by the open questions, as we gain important insights from a relatively large number of government entities. To further populate and extend our framework, in-depth case studies would complement the survey findings.

We identified two areas for further research. First, we identified no evaluation practices in our material. Hence, how to evaluate EA is an area that further studies should address. Second, a potentially troublesome finding in our study was the lack of activities related to involving citizens in government decision-making using participatory processes and collaborative practices. Hence, studying this absence further and investigating how EA may comply with notions of networked government and citizen participation is an urgent challenge for future research.

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