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Between continuity and change: A longitudinal analysis of Swedish local government digitalization strategies

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Abstract: The terminology associated with the use of information and communication technologies in the public sector has shifted over time, from information technology to digitalization. This change raises the question of whether corresponding shifts in government practices have accompanied it. To investigate this issue, we use topic modeling to analyze a corpus of IT- and digitalization strategies from Swedish local governments, produced over three decades. Our analysis reveals salient topics covered in these strategies and classifies them, displaying patterns of both continuity and change. Some of these patterns reflect dominant discourses about technological governance and the provision of digital services based on citizens' needs, but there is also a notable absence of content related to democracy and participatory practices. Taken together,

our study contributes empirically with an evolutionary perspective on digital government strategies and methodologically with the adoption of computational methods for this purpose.

Keywords: Digitalization, Local government, Longitudinal analysis, Strategies, Topic modeling

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1. Introduction

In this paper, we examine the evolution of topics related to the use of digital technology in the public sector. We do so by studying a corpus of strategies formulated to direct the use of digital technology in Swedish local government produced over three decades (1991-2023). By doing so, we contribute to research devoted to analyzing the discursive landscape of digital government by investigating official narratives found in these strategies.

The field of digital government, or e-government, has evolved from a practice-oriented field that emerged in the 1990s, influenced by the success of e-commerce (Grönlund & Horan, 2005), to a multidisciplinary research field, influenced by disciplines such as public administration and information systems (Heeks & Bailur, 2007). In the field's early years, government activities and scholarly attention focused on the use of information technology (IT), fueled by the possibilities enabled by the widespread adoption of the Internet. Since then, the terminology used in practice and research has shifted from IT to digitalization, or digital transformation, and from e-government to digital government. The European Commission (2022b) highlights how the digital transformation journey will accelerate through the move from "IT to digital transformation, from digital skills to digital culture, and from technology as a service provider to digitalization and digital-ready policymaking." Janowski (2015) showed how the focus areas in e-government research have changed over time in four stages, and Scholl (2021) argued that digital government constitutes a second phase as the “d” replaced the “e.” These changes are reflected by name changes in research tracks (e.g., the digital government track in the HICSS conference) and literature databases (e.g., the digital government reference library, see Scholl (2021)), thus indicating an evolutionary trajectory. However, it is important to remember that digital government research has also been accused of reproducing techno-optimistic stories about the transformative capabilities of the latest technologies (Bannister & Connolly, 2012). Thus, there is a need to empirically investigate whether the shift in terminology is associated with actual changes in how governments use and refer to digital technology. In this paper, we argue that local governments constitute an interesting domain for this inquiry as they are responsible for several public services related to education, social care, etc. These are areas where digital technologies have been used for a long time with hopes to improve government operations, which makes them ideal to study longitudinal changes in this use.

Previous attempts to examine evolutionary aspects of e-government include large-scale surveys (Moon, 2002), science mapping (Alcaide–Muñoz et al., 2017), literature reviews (Gil-Garcia & Martinez-Moyano, 2007), and analysis of websites (Pina et al., 2009; Cullen et al., 2003). In this paper, we build on this body of research by analyzing the evolution of local government. However, our approach differs with regard to material (local government strategies) and analytical approach (computational text analysis). This paper aims to investigate the evolution of local government digitalization strategies. We aim to answer the research question (RQ): "How has the content of local government strategies addressing digital technology changed over the past three decades?"

By doing so, we address both needs for more empirical-based evidence to outline if the shifts in research focus have been accompanied by actual changes in how governments perceive and work with digital technologies while simultaneously adopting new methods to conduct such investigations. Here, we argue that government policies, investigations, and strategies play a key role in understanding the discursive landscape of digital government. Such documents carry purpose and intention (Guenduez & Mettler, 2022), create shared problems, definitions, and solutions (Sundberg, 2019a), and stabilize and materialize certain narratives (Lindberg et al., 2022; Nyhlén & Gidlund, 2022). Additionally, local governments have a strong focus on providing front-end service to citizens compared to their central or national government counterparts (Dillon et al., 2015; Erlingsson & Wänström, 2021), at least in the Western context in focus in this paper. Therefore, they are important research objects to study the evolution of digital government over time. Our contribution consists of a longitudinal analysis of strategies describing the intended use of technology expressed in policy documents produced by Swedish local governments.

This paper proceeds as follows: First, we review previous research on the evolution of government digitalization strategies, concluding with a more elaborate description of why such a longitudinal analysis is needed. Second, we outline the research method, including data collection and analysis using topic modeling. Third, we present the findings by analyzing the topic contents and their distribution over time. Finally, we discuss our findings against previous literature and draw implications from our methodological choices.

2. Background: Evolutionary views on government digitalization strategies

Previous research has devoted much effort to investigating the state of e-government in different national settings (see, e.g., Solange et al., 2019; Kolsaker et al., 2006; Mohammad-Kamel et al., 2012; Jain Gupta & Suri, 2017; King, 2007; Linders et al., 2018; Mutiarin et al., 2024; Reddick & Jaramillo, 2014). These efforts also include comparisons of different national settings (Chen & Hsieh, 2009; Al-Nuaim, 2009). However, evolutionary investigations remain sparse; therefore, in this paper, we extend these studies by taking a longitudinal perspective.

In this paper, we argue that analyzing the content of government digitalization strategies is a path forward for longitudinal investigations focusing on the evolution of e-government. Digitalization strategies have become drivers for developing digitalization and digital government everywhere. Such strategies exist at the EU level in Europe (European Commission, 2022) as well as at the national

and regional levels in many countries where they have caught the attention of scholars (e.g., Nyhlén & Gidlund, 2022; Kinnunen et al., 2019). These types of strategies are typically written as policy documents that set digital transformation goals and are designed to instigate the changes needed to reap their supposed benefits (Guenduez & Mettler, 2022; Dolfsma & Seo, 2013). Thus, digitalization strategies reflect their contemporary settings regarding how digital transformation is, or was, perceived.

Previous research presents conflicting findings regarding how changes in the terminology for digital technology in the public sector have been paralleled with changes in focus, purpose, and narratives associated with implementing these technologies. Ilshammar et al. (2005) argued that the shift from "automatic data processing" in the 1960s to "IT" in the 1990s did not entail any shifts in the expected values with the use of these technologies. Most initiatives aimed to increase government efficiency, hence the authors' choice of title, "old wine in new bottles." Service and efficiency are common themes in e-government policies. Sundberg (2019b) highlights a shift towards a more service-dominant logic as the terminology shifted around 2010 from "IT" to "digitalization." Moreover, the two are often expressed together, known as the e-government paradox (Bertot & Jaeger, 2008). The combination of these values has been identified in different government policies (Toll et al., 2020; Persson et al., 2017). Meanwhile, findings from the Danish context suggest that the values proposed in strategies for the use of digital technology were relatively static between 1994 – 2016, and the role of e-democracy was minimal during these years (Persson et al., 2017). Schou & Hjelholt (2019a) identified that Danish digitalization strategies were built on the idea of an ideal citizen to whom certain needs have been attached. These authors (Schou & Hjelholt, 2019b) also illustrated how government digitalization generates new spaces that regulate and govern how citizens interact with the state. Depending on the citizen's position in the welfare system, these interactions differ, and the authors highlight how the spaces provided by digitalization "encompass forms of power and governance that are differentially distributed." (p. 451)

The above examples demonstrate exemplars of previous research on digitalization strategies. However, to the best of our knowledge, research providing insights into the evolution of IT and digitalization strategies over a longer period is scarce, and the current study aims to fill that research gap. Lately, novel computational methodologies have been applied to study the evolution of digital government. For example, Puron-Cid & Villaseñor-Garcia (2023) apply neural networks to characterize the evolution of the Mexican digital government performance over seven years. Although the level of government and the purpose of the studies are different, their study illustrates the potential of such computational methods in analyzing the evolution of digital government - a stream of literature to which this paper contributes.

2.1. Thirty years of e-government in Sweden: A brief overview

As this paper explores the evolution of Swedish local government IT and digitalization strategies between 1991 and 2023, this section outlines key events within the overarching policy landscape in Sweden during this timeframe, alongside a review of previous research in this context.

In 1994, the Prime Minister of Sweden delivered a speech articulating the ambition for Sweden to become a leading IT nation by no later than 2010. This proclamation set the standards for subsequent Swedish administrations, transcending political affiliations. For the public sector, this ambition translated into the adoption of Internet-based technologies to realize the vision of a "24-hour government," a term that was used in parallel with a direct translation of "e-government" (The Swedish Agency for Public Management, 1996).

Establishing the first IT commission (the first of four), comprising expert advisors, marked a step towards advancing this technological agenda and policy development. Gidlund & Sundberg (2021) observed that the expert groups appointed by the Swedish government over two decades exhibited a notable uniformity in disciplinary and geographic representation—predominantly comprising computer scientists and business management scholars from Sweden's capital. The outputs from these groups have been critiqued for their technologically deterministic stance (Karlsson, 2005), imbued with techno-optimism with a focus on economic progression, reinforcing an "IT hype" (Johansson, 1997). Other scholars have underscored the policies' urgent tone during the 1990s, leading to a technocratic governance model that diminished democratic engagement (Ilshammar et al., 2005; Olsson, 2002). The absence of democratic values has also been observed in analyses of more recent policy documents (see, Toll et al., 2020).

In 2000, the central government published a national IT strategy, "An Information Society for Everyone," (Swedish Government Offices, 2000). Hall & Löfgren (2004) critiqued how these visionary Swedish ICT policies, crafted by experts, seldom progressed beyond the agenda-setting phase. Later, the dot-com crisis in the early 2000s plunged many within the Swedish software sector into financial turmoil, prompting them to seek market opportunities in the public sector (Löfgren, 2007).

An action plan was introduced in 2008 (The Swedish Government Offices, 2008), acknowledging longstanding coordination and governance challenges persisting for 15 years, signaling a move towards concrete action. Notably, the plan's ethos evolved from "for everyone" in 2000 to "as easy as possible for as many as possible" in 2008. Melin (2009) described the discursive landscape in Swedish action plans of e-government as rather static, referring to "The emperor's new clothes." Giritli-Nygren (2009) identified in the same Swedish action plan that the use of IT is focused on efficiency and increased service.

The inaugural expert group to incorporate 'digitalization' in its title was formed in 2011: The Digitalization Council. Their report, "IT in the Service of Man, a Digital Agenda for Sweden" (Näringsdepartementet, 2011), echoed the European Union's digital agenda from 2010 (European Commission, 2010), emphasizing delivering sustainable economic and social benefits through a "digital single market." In 2012, the strategy "With the Citizen in the Center" (The Swedish Government Offices, 2012) articulated three objectives: simplifying citizens' lives, fostering an open administration conducive to innovation and participation, and enhancing quality and efficiency through cross-organizational collaboration. The designation "IT Minister" transitioned to "Digitalization Minister" in 2016, reflecting a broader conceptual shift. Heidlund & Sundberg (2023) conducted a study of digitalization strategies in Swedish municipalities and found a repository of general and identical optimistic statements, which these authors referred to as the "parrot syndrome." A digitalization strategy launched in 2017 ambitiously aimed for Sweden to lead globally in capitalizing on

digitalization's potential (The Swedish Government Offices, 2017). Heidlund (2024) remarks on this goal's minimal practical impact. Nonetheless, the establishment of a new national digital government agency in 2018 was a step towards realizing this vision, with the agency subsequently releasing various reports and assessments on Sweden's digital governance progress, including the use of emerging technologies, such as artificial intelligence (see, The Swedish Agency for Digital Governance, 2023).

As outlined in the next section, we contribute to this strand of research by using topic modeling on a corpus of strategies authored in the Swedish public sector.

3. Research method

This paper builds on an earlier analysis presented at the IFIP EGOV-CeDEM-EPART 2023 conference (Rizk et al., 2023). That initial analysis explored two subsets of the strategies analyzed in this study: the so-called IT strategies as opposed to digitalization strategies. While providing interesting insights into the shifts in topics associated with the change in strategy labels (from 'IT' to 'Digitalization'), it raised further questions about the evolution of these topics if a longer time period is accounted for, free from temporal gaps, and capturing a range of different technologies. In this paper, we use topic modeling with a longitudinal perspective to investigate the evolutionary aspect of the digitalization narrative at the local government level. Topic modeling has been widely utilized in information systems (Jeyaraj & Zadeh, 2020; Müller et al., 2016) and digital government research (Guenduez & Mettler, 2023; Isoaho et al., 2021) due to its ability to inductively uncover dominant topics in large text corpora. We apply topic modeling to inductively extract topics from strategies published by Swedish municipalities between 1991 and 2023. The extracted topics are used to highlight the main concepts of interest covered by these strategies. Then, a link is made between each strategy document, the dominant topic(s), and the year it was published, allowing us to present a longitudinal analysis of how these narratives evolved. Hannigan et al. (2019) refer to this process as a rendering process in which topic modeling acts as a "means to juxtapose data and theory" (p. 590). As such, this paper also addresses the recent calls for mid-range theorizing within information systems research using topic modeling (Rizk & Elragal, 2020). Before detailing our data collection and analysis, we first briefly describe the Swedish local government context.

3.1. Research context

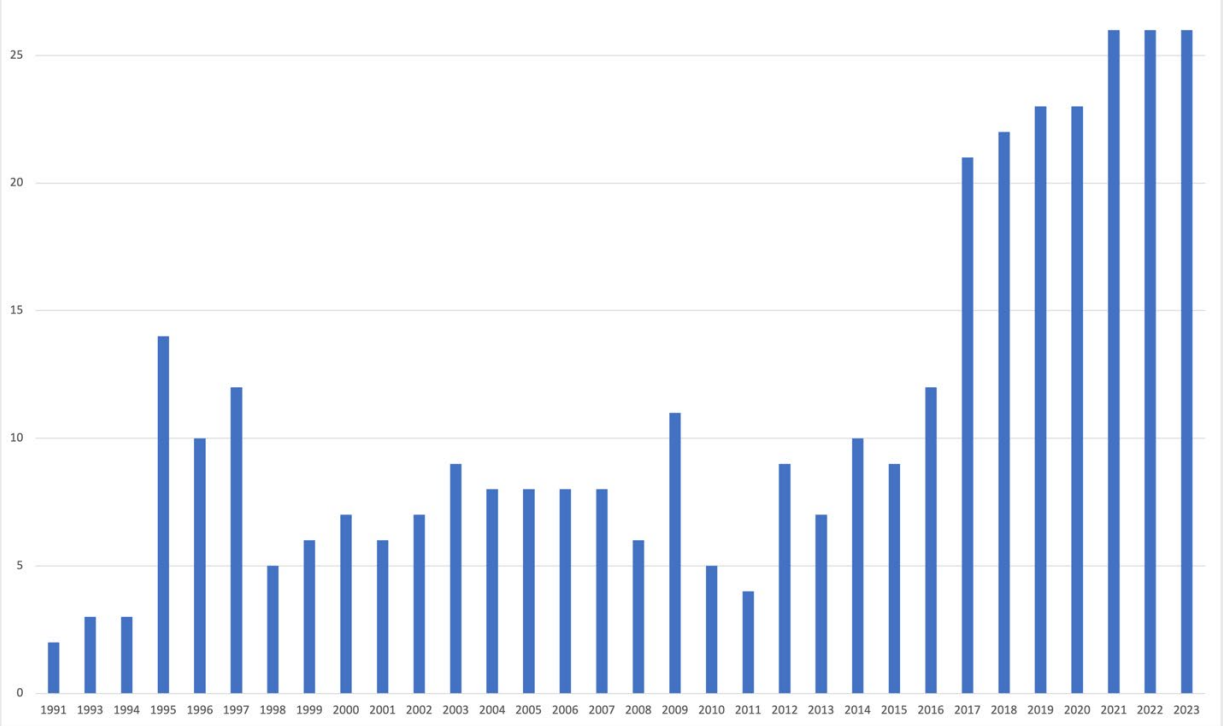
Digitalization strategies can exist on several levels of government, as is the case in Sweden. The Swedish local government comprises 290 municipalities, each of which enjoys a high degree of autonomy vis-à-vis the national government. As a result, there are such strategies both on the national and local levels, with the local level strategies being specific versions and interpretations of the goals set by the national level strategy. It is crucial to note that this context sets an important boundary condition to the results of this study; that is, it assumes a Western approach to governance and a parliamentary chain of command. Accordingly, as mentioned in Section 2, the national strategies and policies provide a vital backdrop to this study's context.

3.2. Data collection

Since the terminology and context describing the documents are shifting, we apply the following distinctions to outline what constitutes a relevant strategy: The document has a clear focus on IT, digitalization, and associated technologies, as well as authored on a strategic level in the local government. The document must be an overarching strategy for the entire municipality and should not be a general strategy concerning government operations, of which the technology of. Concern is a subset. Lastly, the document should be a formal strategic document (i.e., not a PowerPoint presentation or text on a website) with an archival number. In Sweden, this number indicates that the document is subject to the principle of public access to official documents, meaning that a citizen can request it.

After establishing what constitutes a relevant strategy, we initiated data collection by contacting all 290 municipalities by e-mail requesting "all IT, digitalization, or corresponding/equivalent strategies published by the municipality between 1993 and 2023" (note how we ask for corresponding or equivalent strategies concerning both the scope but also other possible technologies, IT and digitalization has been the most prominent but some others have caught the municipalities attention such as ADP, ICT, the use of "e-"). Swedish law requires public authorities to respond to such requests for public documents within a reasonable timeframe, typically within a few weeks. Within two weeks, we received 405 documents. After this period, our analysis commenced, which meant that any documents received later were not included in this analysis. Some municipalities did not have any strategies for 1993 but identified strategies going back as far as 1991, which we included in our dataset, meaning it covers slightly more than three decades. We excluded domain-specific plans attached to strategies for the same year (e.g., a plan for IT in education). Any document with an unknown publishing date was also excluded from this analysis. This resulted in more than 390 strategies published between 1991 and 2023, with the majority published in the last seven years (see Figure 1). It is important to note that strategies typically focus on the work to be conducted the following few years (e.g., a strategy published in 2019 outlines goals and activities for 2020-2023).

Figure 1: Yearly distribution of published strategies



3.3. Data pre-processing

The relevant strategies came in different formats: .pdf, .doc, .docx, and .txt. The .pdf documents were further categorized into machine-readable and scanned files. All formats, apart from the scanned .pdf ones, were machine-readable, which is a key requirement for our analysis. Accordingly, we first applied optical character recognition (OCR) to 110 scanned documents to make them machine-readable, out of which 108 were successfully converted to .txt format. The following pre-processing steps were applied to all documents using the data science platform RapidMiner:

- Tokenization: transforming the text into a sequence of tokens or words and removing special characters and punctuation. However, dashes and slashes were kept because some of the strategies often contained tokens such as "e-strategy," "IT-strategy," or "IS/IT," which we wanted to keep as single tokens.
- Case transformation: transforming all text to lowercase.
- Filter stopwords: removing the most common Swedish stopwords such as "är," "bara," and "inte" (en: "is," "only," "not"). We also removed a list of stopwords customized for this analysis, which focused on municipal contexts, including all municipality names, the words "stad" and "kommun" (en: "city," "municipality"), along their variations.
- Stemming: transforming all tokens/words to their stem. E.g., "infrastruktur", "infrastrukturen" and "infrastrukturer" are all stemmed to "infrastruktur" (en: "infrastructure", "the infrastructure", "infrastructures").

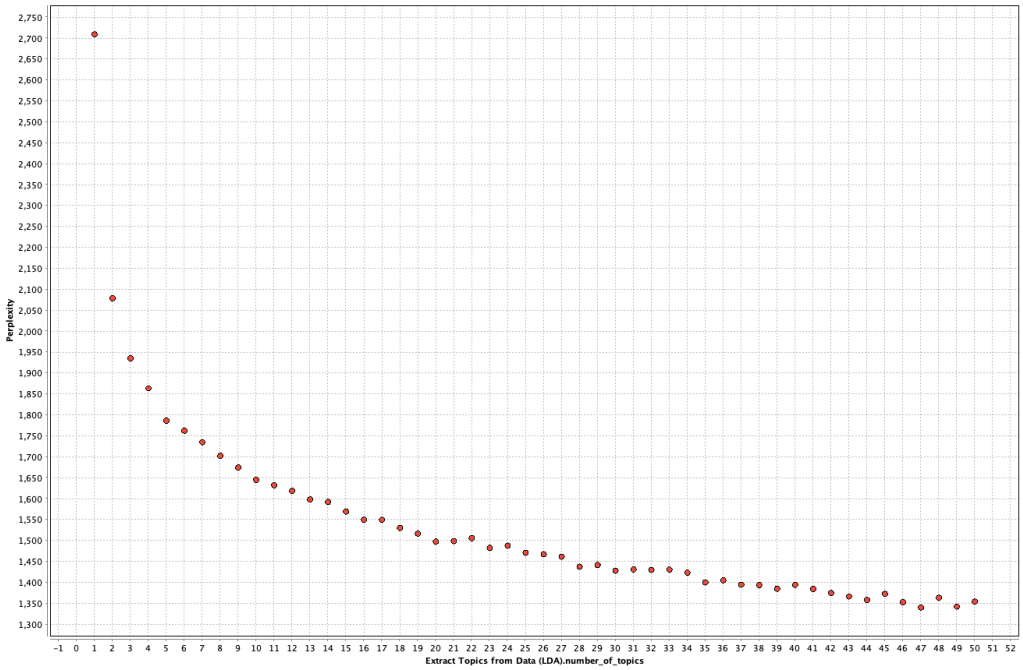
The main purpose of these preprocessing activities is to minimize the variations across the corpus and create a more accurate representation of the repeated tokens (Debortoli et al., 2016; Müller et al., 2016; Rizk & Elragal, 2020).

3.4. Topic extraction and interpretation

Since we are conducting longitudinal analysis, two different topic modeling techniques were explored: Dynamic Topic Models (DTM) and Latent Dirichlet Allocation (LDA). DTM utilizes the transformers-based BERTopic algorithm, which creates dense clusters of topics and, in turn, calculates these topic representations over time (Grootendorst, 2023b, 2023a). On the other hand, LDA is a generative probabilistic model that utilizes Bayesian probabilities (Blei, 2011; Blei et al., 2003). Recent studies comparing the two techniques found that BERTopic achieves higher quantitative performance (Axelborn & Berggren, 2023; Egger & Yu, 2022). However, the algorithm is optimized for short texts or documents (e.g., Tweets or customer support tickets) and assumes one topic per document. Additionally, LDA's results are also found to be better in terms of comprehension and interpretation (Axelborn & Berggren, 2023). Since the strategies we are studying are long documents and typically include more than one topic, we decided that LDA fit better with the nature of our corpus and documents, as well as the purpose of the study.

Our model is a single model trained on the full corpus, which is later used to map the predicted prevalent topic for each document, and a yearly aggregation by topic is performed. To choose the best number of topics, the rate of declining perplexity score (i.e., the trained model's ability to predict words on unseen data). We applied the range of 1 to 50 (Hannigan et al., 2019) and the optimization algorithm showed the lowest decline in perplexity taking place between 19 and 20 topics (see Figure 2). Accordingly, 19 topics were chosen. The topics were finally extracted using LDA based on Newman et al.'s (2009) implementation.

Figure 2: Perplexity score for a given number of topics



The top 15 words and their weights were extracted and interpreted for each topic. Normally, this process is iterative, and the topic modeling and interpretation steps are conducted a few times (Rizk

& Elragal, 2020). However, since this study builds on a previous analysis of a subset of this dataset (Rizk et al., 2023), the list of stop words that usually informs these iterations was already optimized. The interpretation of the topics was done in a validation workshop. One of the authors prepared the top words for every topic beforehand. During the workshop, the other three co-authors provided topic labels by examining the top words and their respective weights. In case of disagreements, the co-author responsible for the topic modeling provided examples of (excerpts of) strategies predicted to belong to said topics until a consensus is reached. Upon examining the topics and top words, two topics were assessed as "noise," whereas 17 topics were labeled. After mapping the topic names to the topics, a list of topic predictions per document and year was extracted to aggregate the topics and number of documents per year. To further prune the results, any topic that contained only one document assigned to it was removed from the visualization to focus on the overall trend. This excluded two more topics. A complete list of the remaining 15 topics and their top words is provided in the appendix.

To present the results, we explored different visualizations, starting with the whole period, where no patterns were clearly visible. We then experimented with different splits into "eras." For example, we tried following decades, i.e., 1990s, 2000s, 2010s, and 2020s, which yielded eras that were incoherent. Following Rizk & Elragal's (2020) guidelines, led to us going back to the literature and policies to check for signposts, such as steering policies. Splitting into the eras described below in Section 4, we observed that three eras contained distinct patterns and fewer topics per era compared to previous splits. This was an indication that they were more coherent. By taking the topics represented in each era, the era itself was labeled following the most dominant features of the included topics.

4. Results

The strategies span over three decades and are named differently over these years. Starting from Automated Data Processing (ADP) strategies in the early 1990s, to e-strategies around the 2000s, all the way to digitalization strategies in the late 2010s and early 2020s. Indeed, IT strategies are the longest-spanning term that dominated the dataset. However, there are also more thematic strategies, such as Green IT strategies and strategies for smart cities. Regardless of the name of the strategy, the interest here is in the topics discussed. Hence, our findings are presented in three "eras" to represent three shifts in the topics dominating these strategies, taking the steering policies (section 2.2) as a backdrop to this presentation.

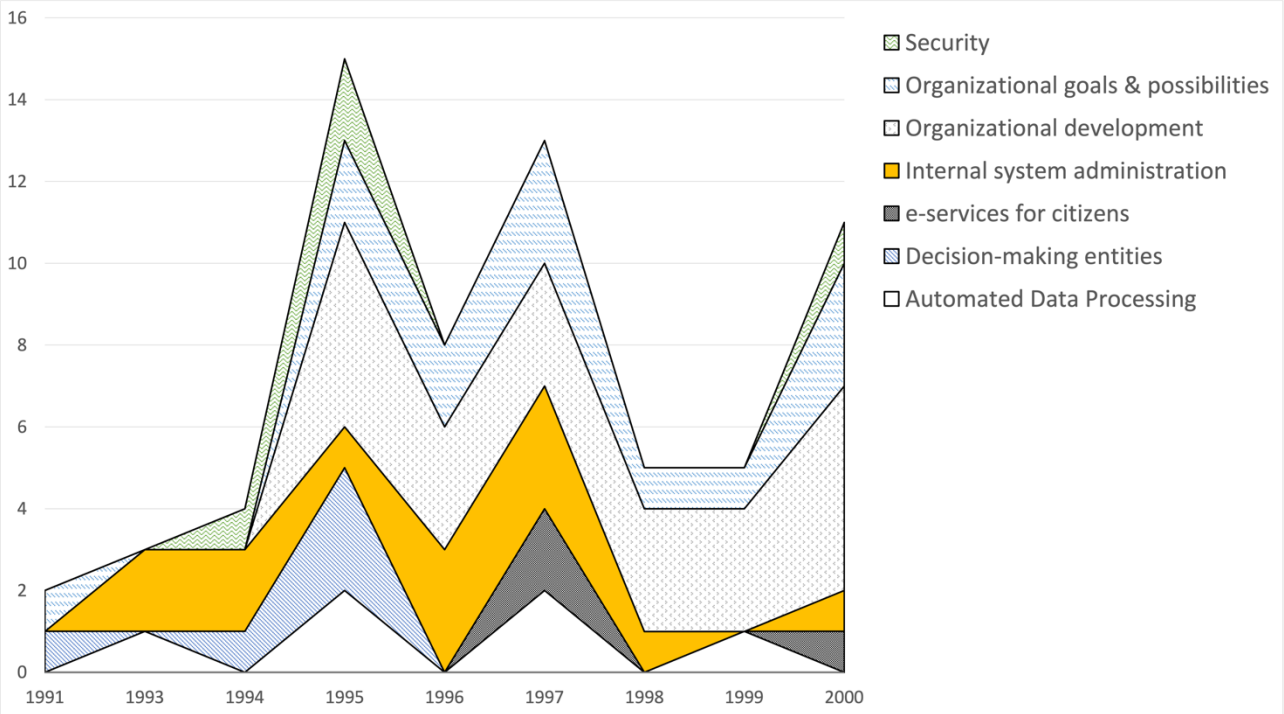
1991-2000: An internal organizational scope

In this era, there is a general balance between the topics covered by the different strategies. The topics primarily focus on internal issues as evidenced by the frequency of topics Organizational goals and possibilities, Organizational development, Internal system administration, and Decision-making entities (Figure 3).

Such internal focus tallies well with the broad strokes of ICT implementation of this era, in that during this time, most technological solutions were generic systems that offered new ways of con-

ducting administrative work (such as email and word processors). We view these topics as representing the reaction to this shift, in that a need for alignment between these new opportunities and the organization arises, to make decisions on what solutions to go for as well as the need to manage them. As such, this era largely represents the digitization of the municipalities as a workplace, with the topics of this era being the policy-level discourse surrounding this transformation. The exception to this internal focus is the topic that started emerging around 1997, addressing e-services for citizens. Around this time, desktop computers and internet access became more commonplace, thus making electronic government services for citizens possible. At this time, the Swedish government also implemented a "home PC" reform that enabled citizens to make tax deductions to buy a computer. Simultaneously, dial-up and broadband internet infrastructures were rapidly developed during this period.

Figure 3: Topics dominating strategies in the era of 1991-2000



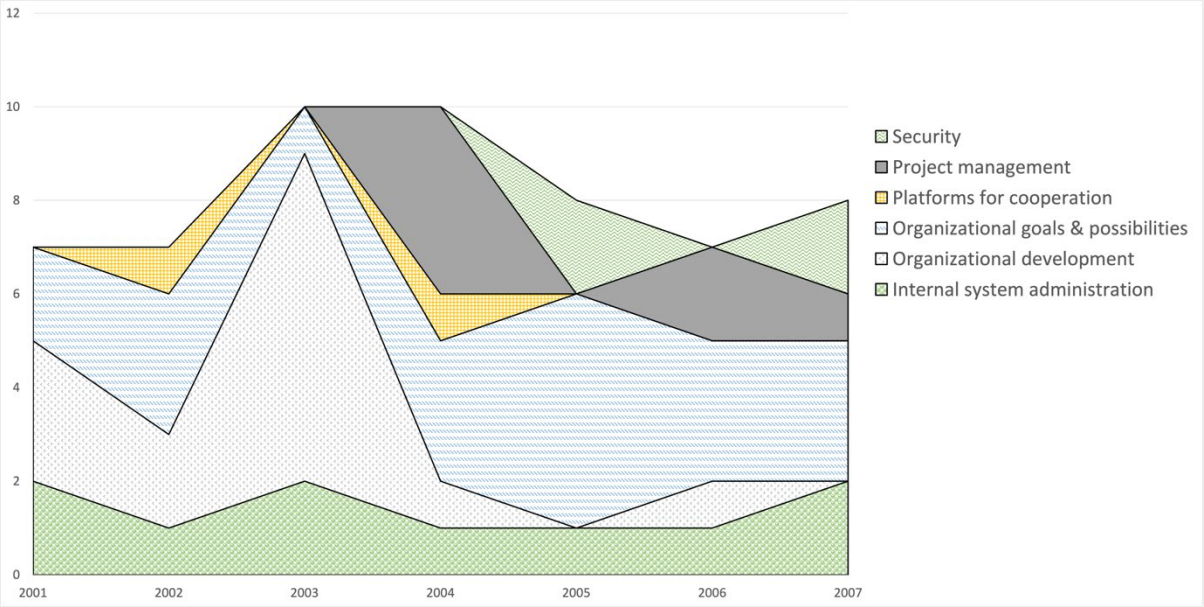
2001-2007: Concrete organizational practices

This era maintains an internal focus despite two changes from the preceding era. First, two new topics emerge in making the focus on organizational practices in managing information technologies more concrete: project management and creating platforms for cooperation with other municipalities. Second, the proportion of the two topics, "organizational development" and "organizational goals and possibilities" has increased significantly in relation to other topics (e.g., Internal system administration).

This era shows that while the internal focus continues, it is becoming more multifaceted. We interpret the emergence of "Project management" and "Platforms for cooperation" as a reaction to a need to manage digitalization ventures in a more granular and nuanced way after the letdowns in

the wake of the burst of the dot-com bubble around the millennium shift. The first of these may reflect the fact that much of new ICT is introduced as part of implementation projects, and projects become a central type of managerial entity of ICT transformation.

Figure 4: Topics dominating strategies in the era of 2001-2007

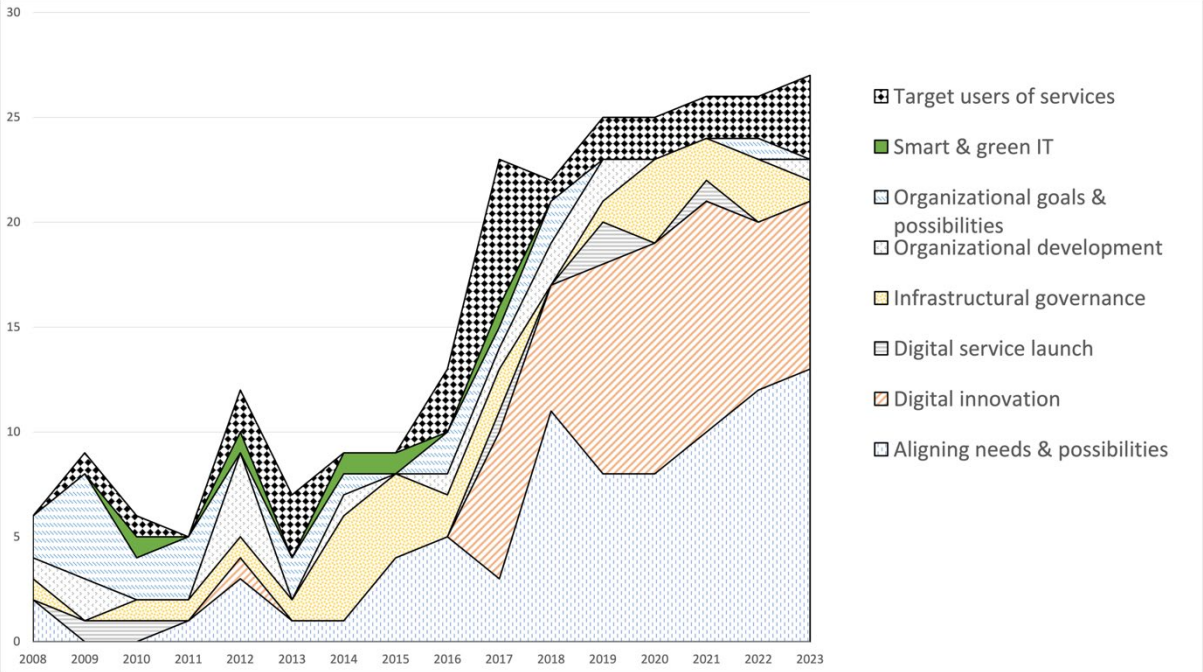


The content of the "Platforms of cooperation" topic indicates that interaction between actors, competencies, systems, and different solutions is an area of consideration. As more work is being mediated through IT systems, the policy discourse reflects the need to strategize how this is conducted. It may also indicate that more things are becoming interconnected through technology. Notably, Security is still a topic of interest in this area, as it was in the preceding one. However, Security does not occur in the next era (described below). While this does not indicate that security has become an unimportant issue, it does indicate that, relatively speaking, less of the discourse in central strategies is devoted to security. For the latter part of this era, the topic "Organizational goals and possibilities" grew. This trend is something that will continue into the next era.

2008-2023: The rise of digital innovation

For this era, the general pattern shows an increasing homogeneity concerning the topics covered during the latter half. Amongst these, the two large topics are "Digital innovation" and "Aligning needs possibilities." We interpret the growth and relative size of these topics as an indication that the general digitalization policy of Swedish society has become more intense and that digital innovation is framed as an important focus area for Swedish municipalities. This era also marks a difference in the scope of digital solutions, where an increased amount of administrative areas are implementing digital (self-)services to citizens, thus necessitating a situation where consideration is needed on aligning needs and possibilities.

Figure 5: Topics dominating strategies in the era of 2008-2023



In addition to these two major topics, this era continues to have topics addressing administration and governance of the technical infrastructure, denoted by the topic "Infrastructural governance." Although it has a different name, this topic shares most of its top words with the topic "Internal system administration" from the two preceding eras. Together with the increasing need for alignment, we interpret this as a result of a multiplicity of systems, applications, and services that emerge with digitalization that requires a different way of technical governance.

Interestingly, the topic “Smart & green IT” appears early in the era but diminishes and dies out approximately after the middle point. This pattern instigates curiosity, given the focus on green issues and sustainability over the last few years. This topic may be either connected to discourse concerning the “smart city” concept, that the discourse has been replaced with other terms, such as “sustainability,” or that the discourse concerning this type of issue has become a stand-alone policy area, i.e., it is not positioned under the umbrella of digitalization strategies.

5. Discussion

Our analysis of three decades of IT- and digitalization strategies highlights continuity and changes over time, thus signaling that digitalization is neither old wine in new bottles (Ilshammar et al., 2005) nor a completely new phenomenon. It can be argued that it is an evolution from IT and e-strategies (and ADP before them) with both a difference in degree and a difference in kind. The differences in kind can be represented by the topics distinct to each era, such as Security in the earlier eras or Smart & Green IT in the latter. Whereas the degree of difference can be represented by the topics that persist (e.g., organizational development) and those that stay relevant but change in scope (e.g., the topic "Internal system administration" morphing into the topic "Infrastructural governance").

Regarding continuity, within all of the eras, there is a clear pattern focusing on internal management and strategizing, which is natural considering the role these policy documents play within the municipalities and why they exist to begin with. As indicated in the Results section, we view these shifts as reactions to the pervasiveness of digital solutions available to the municipalities. However, we can also note that it is possible to relate the shifts to the events presented in section two. For instance, the emergence of e-services as a topic already in the era ending in 2000 shows the readiness to realize the vision of an internet-accessible government envisioned in the early 90s (The Swedish Agency for Public Management, 1996).

Regarding change, the boom of digital innovation in the third era comes in the years after Sweden formulated its official digitalization strategy, which sets high expectations for the public sector at large to utilize the opportunities provided by digitalization (The Swedish Government Offices, 2017), which could further be identified by the majority of strategies being published in the last seven years (see Figure 1). As such, the topics in this analysis show that one of the factors underlying this shift is the intersection of top-down policy push and the possibilities afforded by the general environment of technological development. Another factor could be attributed to a possible shift from planning and exploration in the earlier eras to action and practice in the latter era, focusing on digital innovation and aligning needs and possibilities for digitalization and digital transformation to capture opportunities. Partially, the change in local strategies seems to respond strongly to the national strategies on digitalization and the new opportunities that come with it. Just as Gil-Garcia & Martinez-Moyano (2007) have identified about e-government sophistication, it evolves from national to state and then local, as seems to be the case in our empirical material.

Our findings also support those presented in previous research, where a growing discourse regarding providing services to citizens (Sundberg, 2019b) based on ideals of citizen needs (Schou & Hjelholt, 2019a) is identified. However, this discourse seems disconnected from ideas about the development of local democracy and digital democracy, as our analysis did not render any topics related to such ideas. These findings align with previous studies highlighting the absence of democracy and participatory mechanisms in Swedish local government digitalization strategies (Sundberg 2019b; Ilshammar et al. 2005; Hedlund and Sundberg 2023).

Between continuity and change, some topics display a temporary visibility in our materials. For example, security as a topic has disappeared in the most recent era, while it is a high contemporary priority. Similarly, the temporary visibility of a crucial issue such as sustainability (Smart green IT) does not align with national strategies calling for sustainable digital development. Worth remembering here is that absence of evidence is not evidence of absence, meaning that we do not interpret these results as the diminishment of these topics being an indicator of indifference on the part of the municipalities. As indicated in the Results section, the discourse surrounding these topics may now constitute their own policy areas or have too varied terminology to constitute its own topic in our analysis. For example, many local governments formulate cybersecurity strategies separate from their IT or digitalization ones, which entails that these topics are less prominent in the overarching strategies we included in our analysis. A more provocative way of expressing this phenomenon is that topics of great importance that become distinct policy areas tend to disappear from "general" strategic documents, which generates the question of what importance and impact these strategies

have. As our analysis does not hold the explanatory power to discern why certain topics display such patterns, it constitutes an interesting avenue for future research, as both security and sustainability are topics highly relevant in relation to the discussion of digital technologies in these organizations.

With regards to the chosen method, a computational method applied in the digital government field, it shows several strengths. The large corpus of strategy documents provides a rich dataset that has the potential to provide insights into the ICT and digitalization discourse in local governments. The analysis emphasizes how these topics are represented during the whole period as well as longitudinally through the yearly representations. In other words, it renders the priorities of local governments in relation to ICT technologies that could help further theorization of technological development and use in this context (Hannigan et al., 2019; Rizk & Elragal, 2020). However, the topic modeling method, as with other analysis methods, is also highly dependent on the sampling and design choices of the researchers. An alternative design to a single model with yearly representations was to develop multiple individual models, one for each era. In addition to requiring in-depth knowledge of what distinguishes an "era" or the yearly thresholds that are unclear in the literature, multiple models risk fragmenting the dataset so much that we lose the evolutionary perspective we were after.

6. Conclusions

This paper aimed to investigate the evolution of local government digitalization strategies by answering the research question, “How has the content of local government strategies addressing digital technology changed over the past three decades?”. In this study, we have answered this research question by conducting a topic modeling analysis of policy documents in Swedish municipalities ranging from 1991 to 2023. Based on this analysis, we present 15 topics divided into three eras. These eras show that some topics have persisted or transformed over time, whereas some topics have come and gone. In our discussion, we reflect on how this analysis compares to our previous analysis (of which this paper is a continuation) and what these topics indicate about the discourse landscape in Swedish municipalities over the last three decades. Based on our findings, we offer three main conclusions.

Firstly, our evolutionary perspective on local e-government strategies in Sweden reveals a shift from internal management and organization towards digitalization, digital innovation, and infrastructural governance. This shift can partially, but not completely, be explained by the strong narrative of more digitalization put forth by national and pan-national government entities. Secondly, we identify a dominant discourse regarding the provision of digital services based on citizens' needs, combined with a lack of focus on democratic and participatory processes. Thirdly, we see that these policies and the technology in focus (such as IT and digitalization) have developed to become a distinct policy area; in earlier eras, we find, for example, topics such as security and further sustainability to be part of the policies but in the latest era these are not present. These findings can also be linked to our choice of strategies to include and features of our methodological choice.

Taken together, our study contributes to research devoted to investigating the discursive landscape of digitalization in two main ways: 1) we contribute empirically with findings from a large corpus of local government policies produced over three decades, and 2) we contribute methodologically by using topic modeling in our analysis, showing the method's strengths and weaknesses for this purpose.

For this study, we acknowledge the following limitations. The topic modeling technique used in this analysis (LDA) is a probabilistic model that may, for some applications, not be considered best practice. However, our comparison with the BERT-based techniques has proven that LDA fits the assumptions built into our dataset better (i.e., that each document contains more than one topic). Another potential limitation lies in our sampling technique. The yearly distribution of the strategies received shows a skew towards recent years. However, it is unclear if in these years more strategies were produced or if they were just more accessible by the recipients of our requests at the municipalities. A third potential limitation is the geographical scope of Sweden, which limits the generalizability of the study to other contexts that are not welfare societies or have a similar political milieu. However, we also think this active delimitation presents coherence in the dataset and strength in the model and results presented. A replication of the study is recommended in other countries of similar and different political environments. In continuation of this work, a comparison between the models and the design of universal versus era-based models will be explored in future research. Meanwhile, while we have demonstrated the strengths of using computational methods in analyzing a relatively large corpus of government documents, we also acknowledge the continued need for qualitative inquiries in future studies to enable more in-depth explorations of the topics uncovered in this study. A key focus in such studies could be the impact of digitalization strategies by investigating their practical enactment.

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Appendix: Topic interpretations and top words [1]

Topic	Top words
Organizational goals and possibilities	Organiz*, administ*, use, possib*, goal, organization, system, way/manner, development *verksam, förvaltning, använd, möj, mål, organisation, system, sätt, utveckling*
Organizational development	Municipal*, organiz*, use*, possib*, availab*, development, profits, conditions, area, work *kommun, verksam, anv, möjlig, tillgänglig, utveckling, vinster, förutsättning, område, arbete*
Security	Shall, system, model, secur*, responsib*, every, operation, system own*, technical, information, resource *Skall, system, modell, säker, ansvar, varj, drift, systemäg, teknisk, information, resurs*
Internal system administration	System, use*, shall, administration, model, information, responsib, all, every* *system, använd, skall, förvaltning, modell, information, ansvar, all, samtl*
Automated data processing	Teach*, ADP, exist*, educat*, electronic, computer, device/unit, internet, communication *Undervis, adb, finn, utbildning, elektronisk, dator, enhet, internet, kommunikation*

[1] *A sample of the top words was selected for each topic based primarily on their weight. The words are presented in English (authors' translation) and Swedish (original in italics). Since the words are stemmed, an asterisk * is added to the English word to indicate possible variations (e.g., the responsib* stems from words such as responsible, responsibility, and responsibilities)*

Decision-making entities	Committee, municipal board, date, decision, tSEK (thousand Swedish kronor), municipal leadership, culture, child *Nämnden, kommunstyr, dat, beslut, tkr, kommunledningskontoret, kultur, barn*
e-services for citizens	Will, information, citizen*, important/weight, through, exist*, technology, electronic, internet, service, new *Ska, information, medborg, vikt, genom, finn, teknik, infrastruktur, elektronisk, internet, servic, nya*
Project management	Project, profits, the project, municipality office, e- action plan, e-service, document, under, every* *Projek, vinster, projektet, kommunkontoret, ehandlingsplan, etjänst, dokument, under, samt*
Platforms for cooperation	Application, device/unit, cooperation, collective, operat*, technical, staff, platform, system responsib*, competence *Applikation, enhet, samverkan, gemensam, drift, teknisk, medarbet, plattform, systemansvar, kompet*
Target users of services	Citizen*, development, service, service, information, municipal*, goal, company, need (noun), staff *Medborg, utveckling, servic, tjänst, information, kommunal, mål, företag, behov, medarbet*
Smart & green IT	City, will, reduc*, green, smart, organiz*, sustain*, through *Stad, ska, minsk, grön, smart, verksam, hållbar, genom*
Digital innovation	Digital*, use*, solution, development, innovation, competence, creat*, contribut*, condition, opportunit*

	Digital, använd, lösning, utveckling, innovation, kompet, skap, bidr, förutsättning, möjl
Aligning needs and possibilities	Service, need (verb), work*, through, creat*, increased, new, need (noun), know, information, exist*, importance/weight
	Tjänst, behöv, arbet, genom, skap, ökad, nya, behov, kunn, information, finn, vikt
Infrastructural governance	Strategic, plan, technicak, system, model, infrastructure, requirements, responsib*, decision, support, service
	Strategisk, plan, teknisk, system, modell, infrastruktur, krav, ansvar, beslut, stöd, tjänst
Digital service launch	Service, service, every*, implement/introcuce, via, digital, citizen*, case, process, existing, customer
	Tjänst, servic, samtl, inför, via, digital, medborg, ärend, process, befint, kund

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