Unique Uniform: A Taxonomy for Locally Contextualized Public Service Models *

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Abstract

Public organizations are confronted with a contradictory challenge: On the one hand, they want to increase their service quality by considering their individual local contexts. On the other hand, public services are mostly based on standardized legal regulations, which leads to uniformity in the conceptual models representing those services. Therefore, local contexts are not yet reflected in such conceptual models. Conceptual models should originate from standardized legal regulations but also provide systematic contextualization mechanisms. To support this endeavor, we suggest a preliminary taxonomy for the classification of adaptations in conceptual models of public services to local contexts. We intend to develop the taxonomy following the approach by Nickerson et al. As a result of the first iteration of taxonomy development, the proposed taxonomy consists of five dimensions with 21 characteristics. We also outline the steps of a method for applying the taxonomy to public services. In future work, we also intend to develop a tool that uses the taxonomy to assist public organizations in individualizing their public services to local context.

Keywords

adaptation, conceptual model, configurable process model, public organization, reference modeling, local context, public service, taxonomy.

1. Introduction

Public organizations offer a wide range of services to their clients (citizens and businesses), and many of these services share commonalities because they provide the same results to clients. Exemplary services are similar across different public organizations of a country, such as the registration of residence or application for social benefits. If one were to visit multiple municipalities, there might be identical application forms (e.g., Austria's central "Meldezettel" for registration of residence in different Austrian cities) or forms for the same state service that are different in appearance (e.g., dog registration form in Linz and in Steyr, both in the same state). However, the information asked for is the same in the background, meaning the legal regulation is standardized in structure and functionality.

On the other side, the same services at different public organizations may result in completely different processes despite the function for the client being identical. For example, in Germany, dog taxation is defined in local regulation per city but functionally identical nationwide [1]. This means that even if the reasoning may differ, the public service is functionally identical to the citizen and thus is standardizable in final service delivery. Hence, despite having functionally identical services, local specifics can lead to adaptations locally, radical enough to result in different services [2]. Apart from design differences, there may also be procedural differences due to discretion, where public organizations weigh the applicant's information to make a decision [3]. Generally, a public

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organization starts a process when a public service is applied for, but how the information given on the application is evaluated may cause deviations in the following procedure or result. This is especially true since legal regulations try to capture as many potential cases as possible without blowing the required formulation out of proportion [4]. This interpretation-based deviation is intended in the field of law [5].

The notion that public organizations are increasingly operating in a field of tension between uniformity and contextuality when providing public services has been widespread in eGovernment research for several years. The "digital government evolution", initially described by Janowski [6], towards a phase of "contextualization" in which digital solutions are specifically adapted to the respective application, has since been taken up frequently and was identified as a central area of innovation [7]. This can also be understood as a normative challenge: Public organizations must develop digital services that enable broad access and are tailored to local conditions at the same time. Tavares et al. [8] point out that the context-sensitive provision of services, taking into account diverse social needs, demographic change, and differing governance problems in many countries, is particularly important at the local level, especially when oriented towards the UN Sustainable Development Goals [9]. In cities, the local context is condensed into tangible policies for citizens, which is why local governments are called upon to "build cities and human settlements [that are] inclusive, safe, resilient and sustainable" [8, p. 135]. In this respect, there is a direct correlation between context-sensitive public services and the livability of cities: livability describes the qualities of a city, being "safe, attractive, socially cohesive and inclusive, and environmentally sustainable; with affordable and diverse housing linked to employment, education, public open space, local shops, health and community services, and leisure and cultural opportunities; via convenient public transport, walking and cycling infrastructure" [10, p. 11].

However, it is unclear how to resolve the tension between uniformity of public services and contextual local particularities in conceptual models. Conceptual models are abstractions of reality and are used in the design of IT systems and public services [11]. Public services' effectiveness and acceptance are significantly affected by structural, cultural, or organizational particularities and consequential policy- and target-group foci that make up the local context. Despite the widespread use of standardized frameworks in public services, there is no mechanism for systematically classifying how services and their conceptual models can be adapted to local contexts. To address this gap, we set forth the research goal *to develop a taxonomy that classifies adaptations in conceptual models of public services to local contexts.*

A taxonomy classifying adaptations would assist both researchers and practitioners in separating the concerns of what to adapt and how to adapt in a model for each variation (e.g., legal requirements, political requirements etc.). For each public organization, a checklist for which adaptations result from their strategies (both political and digital) can assist in navigating that field of tension, thus resolving uncertainty in how to implement uniform yet unique public services. In the heavily regulated actions public organizations can take [2], a software tool for guidance using such a taxonomy can help them to know what adaptions they can make directly and where their limits are.

Chapter 2 lays down the research foundation for our research-in-progress paper, stressing the importance of contextualized public services and how configurable models can support that. Chapter 3 details how we intend to develop the taxonomy and how we intend to design a tool for its usage. Chapter 4 presents the preliminary taxonomy and how it may be used. In chapter 5, we give an outlook on further research and the planned evaluation of the tool.

2. Background

2.1. Contextualization of Public Services

The reasoning behind a context-sensitive approach is plausible in view of concepts such as livability, which can be further grounded in the capability approach (Sen [12], Nussbaum [13], Robeyns [14]) that provides an even more consistent focus on the needs of citizens: The capability approach asks

to what extent people are able to lead a self-determined, fulfilled life (e.g., by using public services) – in other words, what opportunities for realization are open to them [12–14]. Applied to eGovernment, this means that digital public services should expand the scope of citizens by facilitating access to information, participation, or resources. A context-sensitive service that takes into account *local* cultural, economic, and social characteristics increases the likelihood that citizens will use it effectively and derive individual added value from it. Overall, context-sensitive services that are designed to increase individual capabilities, in turn, promote livability: they create better opportunities for all population groups to take advantage of and use city services, making the city as a whole more livable.

From a political-administrative perspective, adapting public services to local needs and characteristics also has other advantages that arise less from a contextualization idea than from an individualization idea: With regard to competition between cities [15], the consistent pursuit and communication of individual, context-specific policies can be a means of focusing strategic goals and measures on the city and on the perception of citizens, thus emphasizing individual factors that make a city attractive. As Anholt [16] shows, a positive image of cities can only be established through substantial action and visible policy efforts. The individual design of urban services not only contributes to the capabilities of citizens but also to the image of the city, which in turn strengthens the trust, involvement, and sense of belonging of citizens when using urban offers and public services [16].

A tool that supports administrative staff in modeling e-government processes and identifies levers where contextual factors such as policy priorities can be integrated in terms of process or communication enables public organizations to build a bridge between citizen services that are consistently aligned with legal requirements (uniform), local needs (contextual), municipal strategy (individual) and operational service design. Ideally, this will lead to more positive and consistent citizen experiences – digital public services will be perceived as both effective and fit for purpose, as well as an expression of and contribution to the city's identity and vision.

2.2. Conceptual Models

Models represent, in a simplified form, relevant parts of reality. What part of reality is relevant for this abstraction is determined by the user, creator, and context in a dialogue [17]. By dialogue it is ensured that within their knowledge, different experts can understand each other using the model they created. A model creation starts with requirement specifications, not only what part of reality is to be abstracted and who is supposed to use it, but also how it is represented [18]. Models can go through multiple iterations of development of varying degrees of fulfilling requirements before a final version is agreed upon [2]. In public organizations, a public service can be modeled as a process model, which also assigns activities to employees and depicts which process part requires which documents or data (which by itself would be a data model) [19]. However, this can mean that specific models may not work outside their context. A model representing a car cannot be used to model a plane (unless it is taxiing on the ground, and even then, an abstraction to the level of "vehicle with wheels" may be necessary). Conceptual models are non-complex representations of an object intended to be communicated by a community, anchored in the knowledge of said community [11]. Considering the type of models a public organization can employ, those are, for instance, process models to represent activities in public services, data models for forms and data registries, and decision trees representing the evidence-weighing [1, 19].

Individual adaptations for each public organization based on its context (contextualization) is a different kind of adaptation than individual adaptions for a specific public service recipient (personalization). The delivery of a service can be personalized along a series of touchpoints ("customer/citizen journey") [20] by, for example, suggesting further relevant services [21, 22]. adapting forms by hiding irrelevant areas [23], or adding customized explanations how form areas are relevant for public service processes. These processes can be tailored to a public organization from scratch or based on reference models created specifically with a subsequent contextualization

in mind. Contextualization in public organizations can comprise different facets, hence reference models that map the most relevant of them for each public service are helpful for standardizing elements of contextualization.

Reference models are templates and serve the specific purpose of being reused to create other models [18]. An example for a broad reference model is the process model by Busch [3] for a generic public service: decision need occurs; collect information; identify decision alternatives; weigh evidence; choose decision alternative; evaluate; implement action [3]. Implementing reference models can be done in multiple ways, be it building a new model using the reference model as a reference as its name implies, adding context-specific parts to it or using configurations if given [18].

Configurable event-driven process chains (C-EPC) developed by Rosemann and van der Aalst [24] are an option to generate configurable process models. A C-EPC contains possible variations of a regular EPC within one model, attaching the different alternatives via, for instance, specific configurable gateways where a user can decide to include or exclude it for a model built from the C-EPC. Such a decision would be considered a configuration at build time. A configuration can also be set to conditionally select an alternative. This would leave the final decision for run time. Hence, configurable reference models rely on the alternatives being recognized during the creation of the reference models. [24]

For creation, a public organization can use general guidelines and regulations to deductively generate a reference model for other public organizations. It is possible to prepare for deviations in derivative models by adding configurable nodes with alternatives to a specific model part [18]. A local public organization may modify or configure this model with specifics, e.g., a need for configuration results in decisions being made about the final model [24].

Analog to feedback cycles for a public organization regarding policies and their implementations, individual public organization models can be used to inductively create a new reference model or modify an original reference model [25]. The original reference model can be modified either directly with knowledge from the derived models or indirectly by revisiting information used to deduce the model (e.g., changed policies).

3. Research Design

3.1. Taxonomy Development

A taxonomy is used to classify objects and for its development, we rely on the widespread approach of Nickerson et al. [26]. In their definition, a taxonomy has dimensions, each with characteristics that are “mutually exclusive and collectively exhaustive” [26, p. 340] (MECE). This means that the application of a taxonomy to an object results in one specific characteristic per dimension that describes the object. However, this also means that if a dimension could have an arbitrary combination of characteristics, there must be a characteristic combining the overlapping characteristics into one additional characteristic to maintain the MECE concept.

Up to this stage, we performed a first iteration of taxonomy development and selected the deductive (conceptual-to-empirical) approach [26] for this iteration. We laid special emphasis on the “conceptualization of (new) characteristics and dimensions of objects“ [26, p. 345]. The first iteration was conducted deductively by building on relevant literature (see chapter 4). The resulting characteristics and dimensions were discussed by the team of authors and compared to objects in eGovernment and public service design. In future research, the inductive (empirical-to-conceptual) approach by Nickerson et al. [26] will also be employed in iterations to develop the taxonomy further. This is in line with the requirement of iterative development based on the utility and usefulness in the intended domain, which makes the approach similar to design science research (DSR) [26].

3.2. Taxonomy Application

While our preliminary taxonomy is a first step in enabling public organizations to classify adaptations, we intend to apply the taxonomy in a tool implementation in future work. To be able

to evaluate the taxonomy for both usefulness and utility, a tool applying the taxonomy to real-world cases is to be developed. It should enable the systematic adaption of models to the specifics of a city using the taxonomy which helps to identify and modify model parts. To implement the tool, we intend to apply DSR as specified by Peffers et al. [27]. DSR combines design-oriented approaches as established in creative and engineering domains with information systems to achieve well-designed and engineered information systems [28]. Hevner et al. [28] differentiate between constructs, instantiations, methods, and models as the four output types of DSR. In concerns of our tool, the output is an instantiation. We intend to perform the six phases of DSR as follows:

1. Motivation and problem identification: The results of this phase are mentioned in chapter 1.
2. Objectives: We concluded from initial workshops with heads of public organizations' digitalization departments that adapting public services would require immersive knowledge about the specifics and the public services offered as well as a recognition of the potential value of the tool assistance.
3. Design and Development: Based on the information gathered, we intend to design a prototype.
4. Demonstration: The prototype's functionality is going to be demonstrated through exemplary cases.
5. Evaluation: The prototype is to be evaluated by the potential user base that comprises experts from public organizations.
6. Communication: Our results will be communicated through a full research paper.

4. Preliminary Taxonomy

In this chapter, we present the preliminary taxonomy in **Table 1**. We derived five dimensions from the literature: stakeholder involvement, domain scope, intervention, degree of freedom, and public value. The dimensions group 21 characteristics which are explained as follows.

Table 1
Taxonomy for adaptations in conceptual models of public services to local contexts

Dimension	**Characteristic**						
Stakeholder Involvement	External		Internal		External & Internal		None
Domain Scope	General	Smart Mobility	Smart Environ-ment	Smart People	Smart Economy	Smart Governance	Smart Living
Intervention	Structural				Representative		
Degree of Freedom	Configuration				Change		
Public Value	Improved Public Services	Improved Adminis-trative Efficiency	Open Govern-ment Capabili-ties	Improved Ethical Behavior and Profes-sionalism	Improved Trust and Confidence in Government	Improved Social Value and Well-Being	

4.1. Stakeholder Involvement

The *stakeholder involvement* dimension considers whether adaptations in the service process can or should be created by those responsible for the process alone or if stakeholder participation is needed or desired. For our taxonomy, we recognize four possible characteristics in this dimension: *internal, external, internal & external,* or *no stakeholder involvement.*

The involvement of stakeholders is a central characteristic of modern governance processes in public organizations that have been replacing traditional, hierarchical administrative structures since the 1990s. They emphasize "new quasi-legislative and quasi-judicial governance processes, including deliberative democracy, e-democracy, public conversations, participatory budgeting, citizen juries, study circles, collaborative policy-making, and alternative dispute resolution, to permit citizens and stakeholders to actively participate in the work of government" [29, p. 547]. The eGovernment stakeholder typology by Rowley [30] provides a comprehensive overview of the internal and/or external stakeholders that could potentially be involved in the adaptation of service processes: (1) internal stakeholders: public administrators, other government agencies, politicians, eGovernment project managers, design and IT developers, suppliers, and partners; (2) external stakeholders: people as service users, people as citizens, businesses, small-to-medium sized enterprises, non-profit organizations, researchers and evaluators. By involving stakeholders, the legitimacy and acceptance of the process design and, ultimately, the service delivery itself can be strengthened – as Denhardt and Denhardt put it, ideally to a point where "[p]ublic servants do not deliver customer service; they deliver democracy" [31, p. xi]

4.2. Domain Scope

The *domain scope* dimension considers if a change only affects a specific domain or affects more general aspects. As a domain, we understand different areas of expertise in a city. As an initial starting point, we consider the smart city dimensions by Giffinger and Gudrun [32]. These smart city dimensions are well suited to illustrate the connection between general top-level strategy goals such as "smartness" and the local sub-objectives of departments in a public organization. Given the local requirements, public organizations may set their own characteristics to reflect their domain departments. These could be, for instance, in analogy to the smart city dimensions: traffic, health, public maintenance, citizen desk, social services, climate, security, culture, and IT.

4.3. Intervention

Two characteristics of the *intervention* dimension are relevant according to our taxonomy: adaptations can be made either on a structural-content level or on a formal-communicative level. This can be derived directly from the typical distinction between content and form in design processes.

Structural-content level adaptations directly alter the process elements or flow, including the variation, elimination, or addition of process steps or of decision rules [33]. Hand in hand with process adaptations are decision tree adaptations, as decision tree nodes can correspond to gateways in process models. Process models can also affect data models and vice versa, as data models represent information and evidence that are processed and evaluated by public organizations to reach a decision. For example, cities with a strong sustainability agenda could enforce strict (internal) rules for the printing of documents or special (external) requirements in approval procedures for new buildings. Cities that are visited by many tourists could integrate special support routines or simplified processes for providers of touristic or gastronomic offers.

Representative-formal-communicative level adaptations do not touch the basic procedural elements or flow but the way the process is documented, described, explained, or presented, including visual or medial customizations. Contextualization can be achieved here at various user touchpoints by using accompanying, communicative service design measures ("service evidence") [34, p. 36] in line with the desired integration of local characteristics. This can increase the individually perceived service quality and strengthens the identification with the service offering [35]. For example, in a city that is home to people of diverse cultural backgrounds, multilingualism and intercultural communication could be given more consideration in process descriptions and forms, while in a city with a very homogenous local identity, specific symbols or narrative elements could be included. Cities with a strong digital agenda could provide chatbots or AI agents in application procedures; cities with a relatively high share of older citizens could provide special

guiding materials for digital processes. The initial costs of adaptations on the formal-communicative level can be high, and adaptations have significant effects on the user side (a minimalist, process-oriented interface vs. a visually appealing, modern web interface).

Of course, structural and representative adaptations can go hand in hand, overlap, and support each other, especially when adaptations on the structural-content level are complemented with matching formal-communicative means.

4.4. Degrees of Freedom

The dimension *degrees of freedom* points to two kinds of adaptations that are possible to customize a conceptual model to the local context. While variants can be anticipated and included in a model by design (configurable models), sometimes a necessary change is not in the scope during the creation of the adaptable model and needs to be edited afterward [2, 18]. We identified two ways of adaptation.

First, adaptations of reference models are possible through "configurations". These configurations are decisions made on which alternative to select out of a set of predefined variants. These predefined parts of models originate from the creators of the models anticipating potential adaptations. Local policies can give guidelines and directions on which configuration to favor, e.g., a sustainable policy would favor paperless alternatives and disfavor an alternative that includes printing.

Adaptations as "change" are modifications to a reference model through replacing, adding, or deleting model elements, meaning the outcome or the way something is handled is (radically) changed. Based on jurisdiction, there may be limits on what public organizations can change and legal regulations also reveal whether public organizations are authorized to perform those changes. Hence, a warning might need to be attached to this kind of adaptation. A public organization should check which tasks are mandatory, which are optional, and which are within their authority and jurisdiction to change. For example, such a change could be adding an alternative branch to a splitting gateway which the reference process model has not planned for and which the reference modeler did not incorporate into the reference model.

In consequence, while a configuration comprises the selection of a variant from a set of predefined potential variants in the reference model, a change is an arbitrary adaptation to the reference model. For example, a change might become necessary if such an adaptation was not anticipated by a reference modeler and, therefore, no configuration opportunity is available.

Cities striving for sustainability would, for example, check in a process model any tasks that include printing and adjust the model to include as little printing as possible. This is a general adaptation and could be detected in models using query languages such as GMQL [36], BP-QL [37], BPMN-VQL [38], or BPMN-Q [39].

4.5. Public Value

The dimension *public value* points to the profiteer of the adaptation, whether the general public benefits from this or only specific dimensions of eGovernment public value, e.g., *improved administrative efficiency* or *improved trust and confidence in government* [40]. The multidimensional perspective of the public value framework by Twizeyimana and Andersson [40] and its deep theoretical foundation on a comprehensive corpus of eGovernment literature qualify it as a solid basis for the consideration of the effects of process and design adaptions on public value creation. This is crucial also for the perceived value of services in the given context. Each of the public value dimensions of the framework, depicted in **Table 1**, is associated with key performance indicators, which could also be used as characteristics in the taxonomy.

4.6. Use of Taxonomy

For using the taxonomy in a public organization, we suggest a high-level method that consists of several steps (see Figure 1). The first step in including local specifics is to *identify a public service to*

be contextualized. For the selected public service, based on local needs, *relevant potential points of adaptation (PPAs) can be identified* either through activity patterns [36–39] or other means like keywords. Policy papers by the current government can contain keyword-based indicators used to identify parts in the models to be adapted. A need for adaptation could be identified by a negatively connotated keyword as an indicator to do better, e.g., "print" when the public organization views sustainability as a local specific. These PPAs can be *classified with the taxonomy* according to its dimensions. Afterwards, there is a split between a configuration and change as the kind of adaptation. While configuration only *(dis) favors alternatives*, changes need to be made in accordance with *jurisdiction* (*lock model elements outside of jurisdiction*). The next steps are to actually *select the relevant and prioritized adaptations*, according to the other dimensions, and finally to *enact the selected adaptations*.

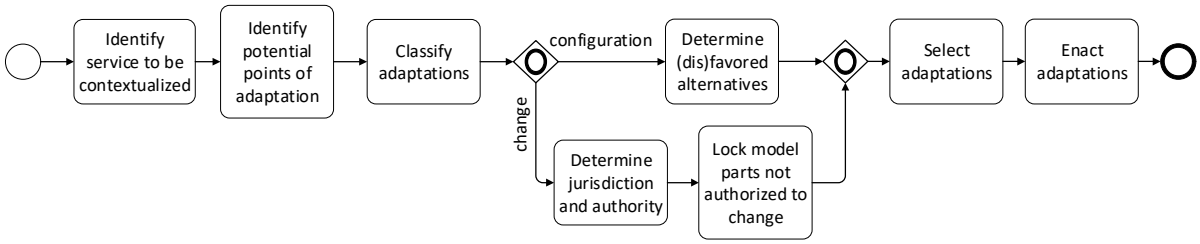

Figure 1: Top-level process model for an application of the taxonomy

5. Discussion and Outlook

This research-in-progress paper intends to provide a *taxonomy that classifies adaptations in conceptual models of public services to local contexts*. The purpose of the taxonomy is to assist researchers and practitioners in identifying and taking appropriate measures to adapt uniform public services to their respective contexts. With this, we hope to resolve the tension between uniform public service provision and local contextualization for livable cities and enhance a public organization's capability to support its citizens' overall well-being.

The taxonomy to classify adaptations has five dimensions: stakeholder involvement, domain scope, intervention, degree of freedom, and public value. For each dimension, we derived characteristics from the literature and we intend to evaluate and iteratively develop the taxonomy in the future.

A limitation of the current research is the complexity of the topic in regard to its involvement with legal requirements as well as uncertainty of additional dimensions and characteristics. Research, as shown in chapter 2.1, has indicated that while there is a need to contextualize public services, public organizations also lack public resources to adapt services comprehensively.

In our future research, we are going to evaluate the taxonomy with practitioners, ideally both legal and IT experts in public services. If the ending conditions of the taxonomy development are not fulfilled, a further iteration to investigate further objects, dimensions, and characteristics may be required to finalize the taxonomy. To further evaluate the usefulness of the taxonomy, a prototype is intended to be implemented to enable the inclusion of adaptations in existing conceptual models.

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Declaration on Generative AI

During the preparation of this work, the author(s) used (1) Grammarly in order to: Grammar and spelling check; (2) DeepL in order to: Translation check. After using these tool(s)/service(s), the author(s) reviewed and edited the content as needed and take(s) full responsibility for the publication's content.

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