

Enterprise architecture for the transformation of public services based on citizen's feedback

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Abstract

Purpose – *Current literature argues that citizen engagement platforms must be used to gather citizens' feedback to provide improved quality of services to citizens. However, limited studies consider the challenges faced by practitioners at the local level during the incorporation of those feedback for continuous service improvement. As a result, these services fail to fulfil the need of citizens. The purpose of this study is to structure the relationship between citizens' feedback and continuous service improvement to meet the need of citizens.*

Design/methodology/approach – *Design science research methodology has been adapted under which a case study approach has been followed to investigate one of the citizens' engagement platforms in Ireland.*

Findings – *The results from this study highlighted that practitioners faced challenges (e.g. capacity, risk and constraints) in terms of fulfilling the needs of citizens and there is a lack of structured approach to continuously provide improved services to them.*

Research limitations/implications – *This study provides a structured approach in the form of a process model to showcase how citizens' feedback can be incorporated for continuously providing improved services to the citizens.*

Social implications – *This research provides a prescriptive view to assist municipalities during the incorporation of citizens' feedback for continuous service improvement while addressing the challenges they face during this process.*

Originality/value – *This paper proposes a process model based on the guidelines of the open group architecture framework enterprise architecture and the collaboration with practitioners that would assist local authorities in continuously providing improved services to the citizens.*

Keywords *Smart cities, Enterprise architecture, Citizens' feedback, Public services*

Paper type *Research paper*

1. Introduction

The key element of future smart cities is to fulfil the ever-increasing needs of citizens (Javed *et al.*, 2022). However, existing literature in the field of smart cities seems to focus on solving technological problems with less attention on non-technical ones, some of which include policy, management and citizens (Habibzadeh *et al.*, 2019; Singh and Helfert, 2019; Nam and Pardo, 2011). Technocratic solutions alone for urban problems cannot bring improvement to the quality of life in a smart city, instead, this approach results in a misalignment between stakeholders' expectations (Marek *et al.*, 2017). Moreover, the quality of public services is one of the vital factors to determine the trust of citizens (Garcia Motta *et al.*, 2021). Hence, governments and organizations need to improve their services for the citizen who is the most important stakeholder of the digital nation (Kar *et al.*, 2019). The importance of citizen participation in the development of smart city services has been emphasized significantly in the literature (Singh *et al.*, 2020; Simonofski *et al.*, 2019;

Cardullo and Kitchin, 2019). Consequently, decisions on the selection, implementation and deployment of smart city services should be made according to the actual needs of local citizens. Many initiatives have been taken to engage with citizens at different levels for obtaining their feedback (Singh *et al.*, 2021). However, city services still fail to fulfil citizens' requirements and in addressing their concerns (Bastidas *et al.*, 2021; A. Wolff *et al.*, 2020; Abella *et al.*, 2019; Andreani *et al.*, 2019; Heaton and Parlikad, 2019). Many local leaders think that technology-focused companies navigate towards costly products that would fail to fulfil the need of the local community (Mondschein *et al.*, 2021). Extensive attention on digital technologies may overlook other critical concerns such as involving important stakeholder's groups, implementation of appropriate technological platforms that would be fit for achieving the desired benefits for multiple stakeholders group (Hafseld *et al.*, 2021). Therefore, technology-oriented solutions in the public sector domain require a logical and structured approach for the transformation of public services and digitalization (Helfert *et al.*, 2018).

Enterprise architecture (EA) can support the transformation and digitalization of public services by providing a medium to manage complex systems and to respond to the need of multiple stakeholders (Jnr, 2021; Bastidas *et al.*, 2021). The main research question, this research aims to answer is "How to support the structuring of the relationship between citizens' feedback and continuous service improvement to ensure that services meet the needs of citizens?" To answer the outlined research question, this research presents a process model based on the guidelines of EA to assist city authorities in the transformation of public services based on citizens' feedbacks. The remaining sections of the paper are organized as follows: Section 2 provides an overview of existing literature on public services, EA and its application in the context of this study. Section 3 provides detail about the adapted research methodology and conducted case study. Sections 4 and 5 provide research, practical and social implications of this study. Section 6 provides limitation of this research and Section 7 concludes the research and provides guidance to the future work direction.

2. Literature review

2.1 Public services in the context of smart cities

Smart cities are the result of urbanization efforts that are driven by municipalities in which many services provided to the local community can utilize ICTs (Kar *et al.*, 2019). The uttermost aim is to accomplish sustainable cities for favourable public services, well-suited living environments, rectified city management, etc. (Wu *et al.*, 2018). The smart city initiative can be broadly expanded into various domain areas such as transportation, waste management, health care and energy (Peng *et al.*, 2017). The public services provided by local authorities in Ireland also distribute across those domains. Government should look at the experience of citizens for providing better public services to them in which collaborative efforts by citizens and the government can lead to novel public services for a smart society (Verma, 2022). More specifically, the interrelationship between individual public services and the convenient smart city customer interface is extremely important (Wirtz *et al.*, 2020). It is also important to highlight that smart services in different domains address different needs that also vary based on the local conditions and context (Peng *et al.*, 2017). Existing literature provides a wide range of smart services and applications in various domain areas. For instance, smart transportation service covers smart parking, smart buses, smart traffic lights, etc. (Peng *et al.*, 2017). Likewise, smart waste management services can include the deployment of smart bins in public areas and households (ibid). This research aims to examine the existing public services that are provided by local authorities of Ireland in the context of smart cities across different domains.

2.2 The role of enterprise architecture in smart cities

Even though earlier developments have resulted in a higher degree of digitalization, there is a need for improvement in the services provided by municipalities (Bosdriesz *et al.*, 2018). Citizens' satisfaction with the city can be predicted based on the material and environmental well-being, public services and facilities and a sense of community (Macke *et al.*, 2019). For an organization to be sustainable, it must consider three perspectives that include economic, social and community engagement (Hysa *et al.*, 2018). It is crucial to capture these viewpoints as organization's quality management, customer satisfaction, operations, environment, etc. all depend on how do they engage with multiple stakeholders (Dezi *et al.*, 2022). There have been many studies that propose solutions for designing smart city services based on citizens' feedback and their requirement. For instance, the sentiment analysis techniques can be used for citizens participation and to improve efficiency in public services (Verma, 2022). Similarly, a methodology has been presented to design and re-design smart city services based on citizens' experiences (Abella *et al.*, 2019). Heaton and Parlikad (2019) proposed a framework that aligns infrastructure assets with city services for meeting citizens' requirements. Another study examined the impact of citizens' feedback on service performance (Allen *et al.*, 2020). Correspondingly, Zhu *et al.* (2022) proposed a theoretical model to assist smart city managers in understanding citizens' reactions during public emergencies, and their behavior in regards to smart city services. Wolff *et al.* (2020) proposed a typology and a set of design templates that highlight citizens' capability to contribute to the design of smart cities. Likewise, Simonofski *et al.* (2019) proposed a framework to define a citizens' participation strategy. Moreover, a capability maturity framework for sustainable connected cities has been developed by focusing on underlying information technology (IT) capabilities that are required to achieve smart city initiatives and services (Maccani *et al.*, 2014). Pourzolfaghar *et al.* (2020) also proposed a smart city framework based on enterprise architectural approach which provides an overview of the different components and their interaction in a complex smart city system. Similarly, a four-layered approach has been proposed by Gobin-Rahimbux *et al.* (2020) for smart city governance in which authors present a technology layer that allow citizens to access services provided by city authorities and provide their feedback on the same. Nevertheless, it was not clear how do city authorities work on citizens' feedback to address their concerns. In addition, none of the above studies addressed the challenges faced by practitioners during the incorporation of citizens' feedback for further service improvement at the local level. Those studies also did not capture the complex workflow between different stakeholders of the system who are responsible for capturing citizens' feedback and further service improvement. As a result, citizens' requirements are not fulfilled and they are left with lower-quality of services in the end (Singh *et al.*, 2021). Hence, there is a need for an approach that captures the issues from multiple stakeholders' perspectives and can assist city authorities in providing effective services to the citizens.

EA has been extensively adapted for planning, governance, managing constant change, complexity and aligning organizations for achieving a common goal (Niemi and Pekkola, 2020). EA in the context of cities is composed of principles, a set of models and methods that can support strategic planning and design of cities (Bastidas *et al.*, 2017; Babar and Eric, 2015). It does not provide a specification for the implementation of the projects rather it is a high-level description wherein its artefacts provide high-level guidance for the development of the projects (Boyd and Geiger, 2010). It supports the city's constant system transferring strategies into actual daily implementation (Anthony Jnr, 2020). It can be used to provide a complete narrative of the smart city by describing the significant IT artefacts and business processes (Zimmermann *et al.*, 2016). Even though EA has so many benefits to offer, its application in the smart city is scarcely noted in research (Helfert *et al.*, 2018; Goerzig and Bauernhansl, 2018; Anthony Jnr, 2020). EA provides information systems, business processes and infrastructure required for smart city development (Goerzig and Bauernhansl, 2018). It aims to build transparency by documenting the tangible state of city

systems and providing control to city administrators for managing complex processes and information systems (Anthony Jnr, 2020). Consequently, EA has been identified as a suitable approach for managing the complex process of the Council, the implementation of their action plans required for public service transformation and the incorporation of citizen feedback for continuous service improvement. By adopting an EA approach, city authorities would be guided in their transformation of public services based on the feedback of citizens.

2.3 The enterprise architecture framework

EA is the process of translating the business strategy into enterprise change by identifying, communicating, planning and enabling the organization's evolution to the desired future state (Jacobson, 2009). It assists in improving decision-making by forming a structured and transparent decision process (Tamm *et al.*, 2022). Some of the benefits of implementing EA include improved customer satisfaction, decision-making, increased efficiency, reduced complexity and risk, providing a high-level overview of an organization along with the direction to improvement (Niemi and Pekkola, 2020; Hodijah *et al.*, 2018; Lankhorst, 2017; The Open Group Standard, 2018). The most commonly used EA frameworks are The Open Group Architecture Framework (TOGAF) and The US Federal Enterprise Architecture Framework (FEAF) in which about 32% of public sectors use TOGAF to implement EA while about 25% use FEAF (Ansyori *et al.*, 2018;). TOGAF is a more popular EA framework among others as it is easy to understand and provides a clear process for implementation (Bouafia and Molnár, 2019; Anggraini *et al.*, 2019). It is used by most of the organizations to develop business values and proficiency, and provides a global approach for designing suitable services (Safaei *et al.*, 2022). It has been found as the most reliable EA in the world in which 80% of the companies from the list of 50 global companies use it (Kotusev, 2018). Thus, this research adopted the TOGAF EA framework among all to address the challenges faced by city authorities in addressing citizens' concerns within the context of this study. Architecture development method (ADM) forms the core of the TOGAF standard and explains a method for managing and developing the lifecycle of an EA. The TOGAF standard and its successive versions are established and maintained by the member of The Open Group Architecture Forum (The Open Group Standard, 2018). The proposed solution encapsulates captures key activities from TOGAF ADM phases to align practitioners' action implementation plans based on citizens' feedback for continuous service improvement. The adapted phases from TOGAF ADM will enable city authorities in providing improved services to the citizens by considering the following:

1. Architecture vision

This study found that there is a lack of understanding about how the long-term vision should be defined based on the feedback of citizens to achieve the desired goals. The architecture vision phase from the TOGAF EA framework can be useful to develop a business plan by providing details about problem definitions, processes, objectives and responsibilities for achieving the anticipated goals (Pourzolfaghar *et al.*, 2016). Therefore, this study adapted key activities and artefacts from this phase to address the identified challenges associated with the vision of the project in the context of this study.

2. Business architecture

This study also observed during the problem investigation phase that there is a lack of consideration of quality factors which could be useful to measure the performance of the services and to address citizens' concerns. TOGAF business architecture (BA) can guide how an enterprise (Council) needs to work to achieve its goals and react to the strategic drivers for addressing different stakeholders' concerns such as city authorities, service providers and citizens (The Open Group Standard, 2018). Hence, this study used concepts

such as key performance indicators (KPIs), quality factors, drivers and contracts from the BA phase for assessing service performances based on citizens' feedback.

3. Requirement change management

This study also identified that citizens' requirements often change over the period. Therefore, the constantly changing requirements of citizens should be managed based on the priority of their needs. TOGAF requirement change management (RCM) phase can assist in this process by driving the whole process of managing the new requirements while considering any changes in their specifications during the development phase ([Kornyshova and Barrios, 2018](#)). As a result, this study adapted some of the activities and artefacts that support managing the constantly changing requirement of citizens within the scope of this study.

3. Research methodology

This research adapted design science research methodology (DSRM) as the main research methodology that guided the research process. This study conducted semi-structured interviews with practitioners for data collection as a part of a case study approach during different phases of DSR research methodology. For instance, data was collected to identify the challenges faced by practitioners during problem investigation phase, then data was collected to gather their feedbacks to design the proposed solution during design and development phase and finally, the model was evaluated during ex ante evaluation in demonstration and evaluation phase. This process is iterative in nature and the feedback from one phase was fed to another one to continuously evaluate the solution until the main objective was met. Design science follows an engineering approach in which solving a particular problem is a key ([Hevner et al., 2004](#)). This is in line with the aim of this study as well. There are multiple reasons for adopting DSR in the context of this study which has been discussed as follows. Firstly, design science is a well-established research methodology in the field of IS and its goal is to extend the capability of people and organizations in solving IS problems ([Drechsler and Hevner, 2016](#); [Walls et al., 2004](#)). Secondly, the main aim of this research is to structure the relationship between citizens' feedback and continuous service improvement for addressing the challenge of having a lack of structured approach to provide improved public services to the citizens in a local government context in Ireland. This relationship is captured in the form of an artefact (process model) which is a product of the DSR. Thirdly, design science defines a process for creating and evaluating such artefacts which are critical for this research and also enhances the quality of the resulting artefact. Finally, it provides a framework for incorporating different research methods (e.g. qualitative and quantitative) and assists in continuously evaluating and improving the artefact ([Peffer et al., 2007](#)). [Peffer et al. \(2007\)](#) defined six steps for implementing the DSRM as:

1. motivation and identifying the problem;
2. defining the objectives;
3. design and development;
4. demonstration;
5. evaluation; and
6. communication.

This research combined Steps 1 and 2 into the problem investigation phase. Similarly, Steps 4 and 5 were combined into the demonstration and evaluation phase. This is because this study conducted those steps together during different stages of this research. The following sections will provide details of how the design science methodology was adapted for this research.

3.1 Problem investigation

During this phase, the problem and research gap were identified, based upon which the objective of the research was defined i.e. developing a process model for assisting city authorities in continuously providing improved services to the citizens. This research is based on an ongoing collaborative approach with one of the County Councils in Ireland. To identify the relevance of the problem in the real world, a case study was conducted based on an offline citizen engagement program in Ireland. The detail of this case study has been provided in sub-section 3.1.1.

3.1.1 Case study: community prospect from county council A in Ireland. An exploratory case study was conducted to investigate the research problem from the real environment for which an offline community engagement program “community prospect” was selected. To retain the anonymity of the program and council, the original names have been anonymized. This program works with communities to recognize and prioritize projects/services that are important to them. It invites members of the community to contribute to the process and provides an opportunity to discuss their views and visions for the future development of their areas. The goal of conducting this case study was to gain a better understanding of how local authorities gather citizens’ feedback and address their concerns.

Four semi-structured interviews were conducted during the problem investigation, the design and development and demonstration and evaluation phases of this research for the data collection purpose. The interviews were conducted online using Microsoft Teams. The duration of the interviews was between 30 and 60 min. This study selected practitioners who were involved in service improvement or/and in community engagement process.

Interview data were analysed inductively using NVivo software which has been designed for computer-assisted qualitative and quantitative data analysis. Moreover, 13 supplementary documents (provided by practitioners) were used as a secondary source of data to analyse the various aspects of the program. The document analysis was performed manually to understand the overall engagement process. These documents also provided information on the feedback that was provided by the local community on different services. The data analysis strategy was to identify and classify the challenges faced by practitioners and map them to the phases of TOGAF.

3.1.2 Identified challenges from the case study. The results from the case study showed that there are challenges faced by practitioners in mapping citizens’ requirements. These challenges have been discussed in this section. For instance, one of the challenges was associated with the mapping of the requirements (Singh *et al.*, 2021). Participant 2 highlighted “like the major block is how do we match their requirements; the resources is a huge thing because we never have the resources to do everything we want to do exactly” [Participant 2]. Similarly, it was emphasized that it is not only about matching their requirements, but also about community expectations, and setting the goals which are achievable “the expectations are built, that something will be done about it. But if you do sit back and take the time, kind of to analyse, and it’s who does that is the question, then? What are the desires of the community? Is this achievable?” [Participant 3]. Furthermore, it was flagged that consideration should be given to the risks of not meeting the goals and desired outcomes “so it’s about setting goals. realistic expectations for the groups in relation to [...] you don’t want a situation that it becomes a document on the shelf until you review it again. And then you’re at the risk, then is that you haven’t achieved what you wanted to achieve” [Participant 3]. Another important factor that was identified during the interviews was about council’s capacity to achieve the desired outcomes that community expects from them. As a result, it becomes essential to keep transparency between council and the community in terms of providing solutions to them and the capacity they require to deliver the expected outcomes “even in setting out the solution, or a proposed solution, that the community would believe that the council is taking some ownership of that, whereas it

might not have the capacity to do that” [Participant 3]. It is also important to understand that council alone is not responsible for all the services, there are multiple stakeholders who are involved in the process and it is about a partnership among them including local community. “Our program really is a partnership, so it would be up to the Community and the Council then to work together or whatever other agency it was [...]. It would rarely be just the Council” [Participant 1]. Also, the focus should not only be given to the planning of the project but also on how does council plan to work on those plans and address the concerns raised by the Community with monitoring and delivery of discussed actions “it’s all fine and well having the document, but how do you action is? And how do you monitor the actions and the delivery of the actions? Because, you know, the risk is that, you know, the plan is done, everyone’s worn out developing the plan. And then well, that’s actually only the start of the work” [Participant 3].

As a part of this case study, we also examined secondary sources of data to understand the engagement process and how requirements are managed. Based on this examination, it was not clear how the community’s requirements are managed during the progress review and renewal of the action plans by the practitioners at Council A. Since, there are multiple services for which the community provides their concerns. Therefore, it becomes challenging to manage the community’s constantly changing requirements.

The results from the case study showed that there are multiple challenges faced by practitioners in mapping citizens’ requirements, and are associated with non-technical factors such as risk, capabilities, goals and constraints. This study found that those challenges can be classified across different domains of TOGAF EA, and there was a need to provide a complete overview of the system. Thus, this study proposes a process model based on the guidelines of TOGAF ADM that would assist in addressing those challenges and provide a complete overview of the system. The next section would provide a detailed discussion of how those challenges can be addressed by following TOGAF ADM guidelines and artefacts.

3.2 Design and development

This study aims to capture the complex workflow between multiple stakeholders and factors that impact the service improvement in the form of a process model as discussed in previous section by following TOGAF ADM guidelines. The guidelines have been adjusted to address the practitioner’s challenges during the incorporation of citizens’ feedbacks. To design the proposed process model, three main activities have been identified as crucial in the development (Ostrowski and Helfert, 2012). These activities are literature review, collaboration with practitioners and relevant modeling techniques. A systematic literature review was conducted by following a three-stage procedure as proposed by Yigitcanlar *et al.* (2019, p. 352). The second step is collaboration with practitioners which plays a substantial role in the design process. For this purpose, data was collected from semi-structured interviews with practitioners in County Council A in Ireland. Finally, for the modeling purpose, Business Process Model and Notation (BPMN) have been selected to design the proposed solution using the Bizagi modeler.

Figure 1 provides an overview of the proposed process model in which the left side of the Figure represents how feedback can be captured via multiple platforms for different types of services in the city. The right side of the model provides modeled activities from TOGAF ADM for incorporating citizens’ feedback for further service improvement. It should be noted that only those activities have been modeled which are relevant in the context of this study and are required to address the identified challenges (see Figure 2). The detail of individual lane within the model has been discussed in the following sections.

- Lane 1 (citizen engagement team and councillors);
- Lane 2 (service department);

Figure 1 Proposed process model

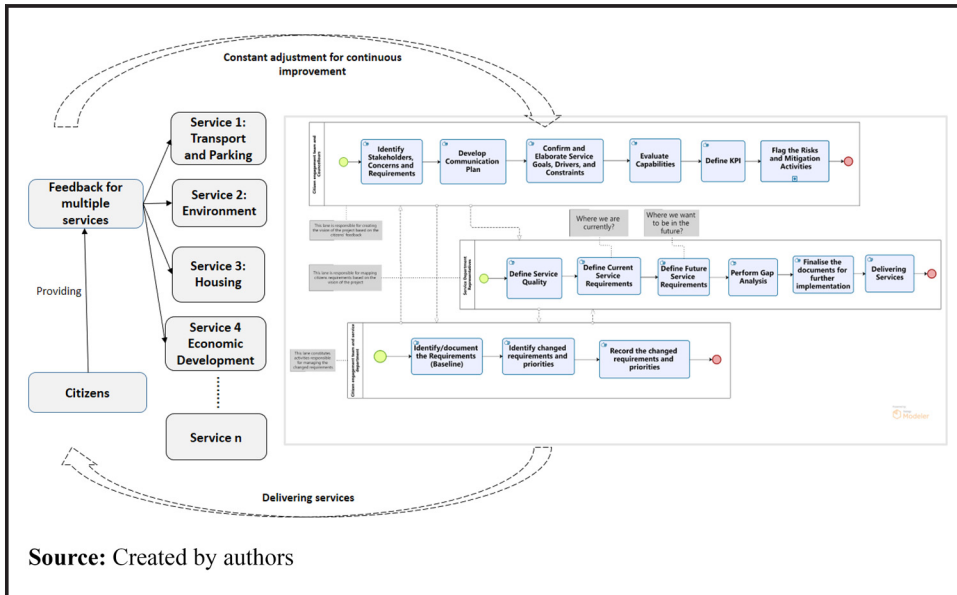
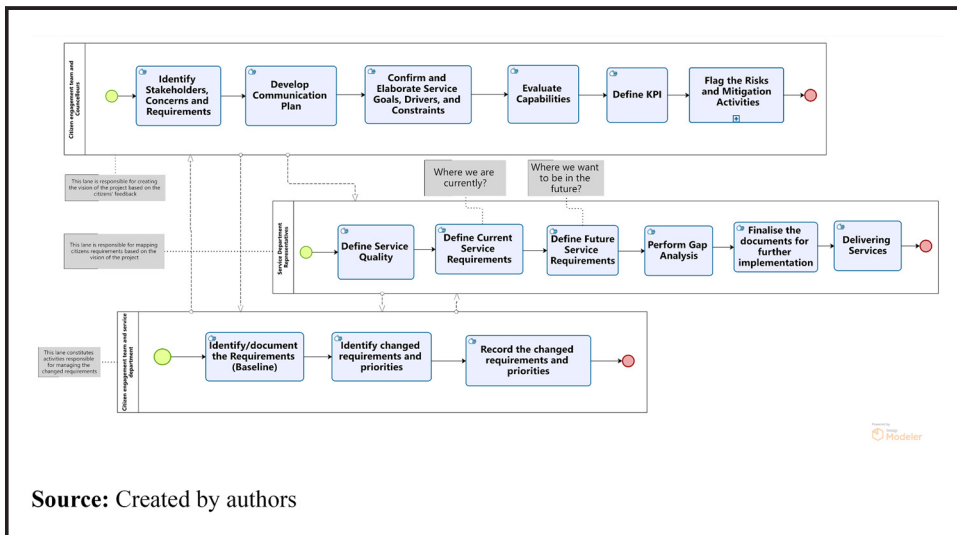


Figure 2 Modelled activities

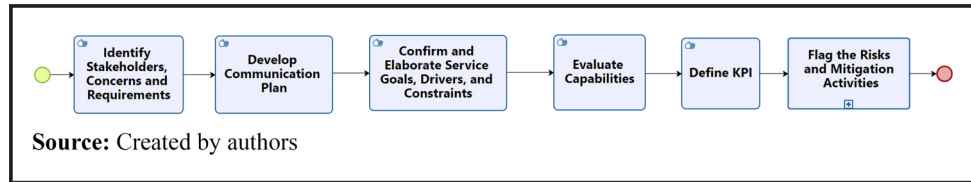


- Lane 3 (citizen engagement team and service department); and
- The interrelationship between lanes.

1. Lane 1 (citizen engagement team and councillors)

The architecture vision is created initially during the lifecycle of the project that provides a high-level view of the end product ([The Open Group Standard, 2018](#)). This section provides detail about the key activities of the architecture vision phase modeled in Lane 1 ([Figure 3](#)). The detail of all the associated activities and tasks are provided in the section below. These activities need to be performed by the community representatives (part of the community

Figure 3 Lane 1



engagement team), and councillors of the council for creating the vision of the project. The definition of each activity has been provided by [The Open Group Standard \(2018\)](#).

a) Identify stakeholders, concerns and requirements: The purpose of the vision is to agree at the outset on what the desired outcome should be for the project so that stakeholders at Council can focus on the critical areas to validate feasibility. At this stage, stakeholders are identified, and their concerns and requirements are validated. This would capture the requirements and concerns of city authorities, community and other stakeholders who might be involved in the process.

b) Develop communication plan: The development of a communications plan for the project allows for the communication to be carried out within a planned and managed process. As there are multiple departments and stakeholders involved to deliver the services. Consequently, it becomes vital to have effective communication between them. This would help city authorities to exchange the desired information on time needed for the successful delivery of the services.

c) Confirm and elaborate on service goals, drivers and constraints: Identify the service goals and strategic drivers for delivering the services. Drivers are defined as external or internal condition that motivates the organization to define its goals. For example, citizens' satisfaction towards the services could be a driver for city authorities to design effective services for the citizens.

d) Evaluate capabilities: Capabilities define what an organization/council must be able to do to successfully achieve its strategic goals. For instance, the goal could be to improve the parking service facility for the community. Thus, existing capabilities should be evaluated and improved to achieve this goal.

e) Define KPI: Define the performance metrics and measures to be built into the project to meet community needs. This can be linked with satisfaction factors towards the service obtained from the community side as a part of the citizen engagement process.

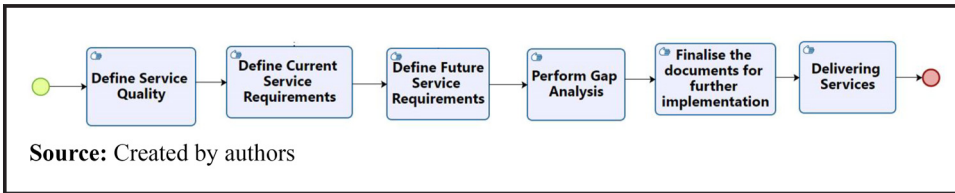
f) Flag the risks and mitigation activities: The risk will be there with any business transformation project. Thus, it is vital to identify and classify risks with mitigating strategies before initiating the projects so that they can be addressed during the transformation. This is particularly important in the context of public service transformation due to the complexity of these services and would highlight potential risks in the transformation process considering what can be achieved based on the community feedback.

2. Lane 2 (service department)

BA describes how the enterprise should operate to accomplish desired business goals, respond to the strategic drivers that are set in the architecture vision phase and addresses stakeholder concerns ([The Open Group Standard, 2018](#)). The supporting key activities from this phase have been modeled in Lane 2 ([Figure 4](#)) to support the vision of the project and are outlined below. These activities need to be performed by the associated departments responsible for delivering the services. The definition of each activity has been provided by [The Open Group Standard \(2018\)](#).

a) Define service quality: Concepts such as measure, contract and service quality from this phase can assist in applying the measure to quality factors of the services for achieving desired outcomes and tracking the actions. As multiple service providers can also be involved

Figure 4 Lane 2



to design new services or in addressing specific concerns for the community. Hence, a contract could apply to them based on the community satisfaction level towards the service.

b) Define current service requirements: This can indicate the key components of the service at the business, service, application and technology level in its current state. For instance, it can represent the requirement for replacing traditional parking systems with e-parking services or to improve existing e-parking services based on community feedback.

c) Define future service requirements: It would define the interrelation between services, applications and technology components for the future state of the service. For instance, the transformation of a traditional parking system into smart one (e-parking).

d) Perform gap analysis: At this stage, it is important to consider what may have been forgotten or accidentally left out, or not yet defined. For example, the most critical gap that should be considered is community/council concerns regarding the services that have not been addressed.

e) Finalize the documents for further implementation: Once all the above activities have been conducted, a document needs to be finalised with all the technical requirements required to implement the new changes in the subsequent phases.

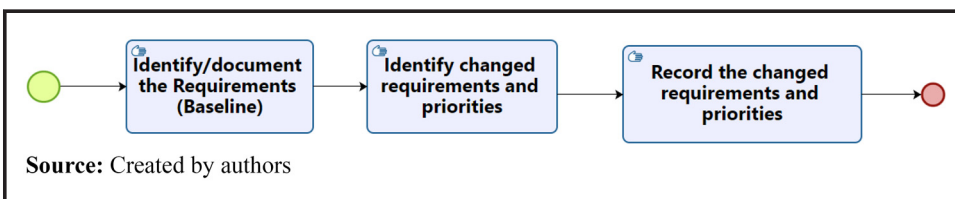
f) Delivering the services: The final activity is delivering the services to the citizens. Once all the activities have been performed in the previous stages, then relevant stakeholders from the service department need to deliver services to the citizens.

3. Lane 3 (citizen engagement team and service department)

The objective of the RCM phase is to manage requirements identified during the execution of any ADM cycle or phase (The Open Group Standard, 2018). The RCM phase can assist in managing the changed requirements arising from the community end. As this research implemented architecture vision and BA phases in the context of this study. Therefore, any requirements originating from either of these phases are managed by the RCM phase and the relevant activities have been captured in Lane 3 as depicted in Figure 5. These activities can be performed either by the associated service departments or the citizen engagement team, and the Councillors of the Council for managing the changed requirements. The definition of each activity has been provided by The Open Group Standard (2018).

a) Identify/document the requirements: The first step is to identify the requirements originated from any of the ADM phases modelled in Lane 1 (architecture vision), and Lane 2 (BA) based upon the given business scenario.

Figure 5 Lane 3



b) *Identify the changed requirements and priorities:* If the community or any other stakeholders change their requirements in the future, then priorities have to be re-assessed based upon which existing requirements (Baseline) are modified/added.

c) *Record the changed requirements and priorities:* Requirements arising from the ADM phase (Derived from the previous step) are prioritized and stored. The initial requirements can be recorded as a baseline requirement by the community engagement coordinators that should further be confirmed by all the stakeholders at the council.

4. The interrelationship between lanes

The first lane captures multi-stakeholders concern that include the community, city authorities and other relevant stakeholders from different departments. Then the output of Lane 1 is forwarded as an input to the next Lane 2 for specifying the requirements of the services based on the stakeholder’s concerns. Lastly, Lane 3 captures the activities to manage any change in the future requirements that could arise from first two phases (Lane 1 and Lane 2). The resulting output from this lane is then fed back to either of the phases from where the changes was originated to update the existing requirements.

3.3 Demonstration and evaluation

This section provides an overview of the evaluation strategy followed in this study to evaluate the proposed process model to validate the design specification and requirements. Evaluation is a key activity in the DSR process because it provides feedback to improve the later development, and ensures the rigor of the research if completed appropriately (Venable et al., 2016). This study conducted an ex ante evaluation to validate the specified problem and to design the proposed solution (Model). Based on the practitioners’ feedback, the artefact is evaluated iteratively and improved in the subsequent cycles. This process is repeated until the objective of the research is met. The interview details have been provided in Table 1 (see sub-section 3.1.1) and the detail of the evaluation strategy has been provided in Table 2.

Based on the conducted interviews, further design changes were made to improve the artefact in the next iteration of the design cycle. These changes have been reflected in the

Table 1 Interview detail

<i>Participant numbers</i>	<i>Roles</i>	<i>Responsibilities</i>	<i>Total number of interviews</i>	<i>Time</i>
Participant 1	Community prospect co-coordinator	Responsible for engaging with local community	1	30–60 min
Participant 2	Head of strategic capital projects	Responsible for decision-making regarding community engagement and service improvement planning	2	
Participant 3	Head of community prospect program	Responsible for overall community engagement program	1	

Source: Created by authors

Table 2 Evaluation strategy

<i>Inputs</i>	<i>Outputs</i>	<i>Evaluation criteria</i>
<ul style="list-style-type: none"> ■ Design specification ■ Design objectives ■ Stakeholders of the design specification 	<ul style="list-style-type: none"> ■ Validated design specification ■ Justified design requirements 	<ul style="list-style-type: none"> ■ Understandability ■ Clarity ■ Usefulness

Source: Adapted from Sonnenberg and Vom Brocke, 2012

proposed process model as shown in [Figure 1](#). These changes included non-technical names for the activities, a simple process and sub-process and more templates and visuals within the model. Interview data were coded following a pattern-matching method in which common themes and expressions were categorized and the original model was revised based on the data analyses (Creswell, 2013; Yin, 2018). The interview questions were designed to validate design specifications and the model as a whole unit. Therefore, it confirmed the representation of the domain and increased the reliability for the next iterations of the artefact. The content and the structure of the model were further validated during the build and evaluate cycle of the artefact.

3.4 Communication

DSR should be communicated effectively to a wider range of audiences including technology and management ([Hevner and Chatterjee, 2010](#)). The last phase of design science is “Communication” in which research findings are reported and communicated to practitioners and researchers. The results from this case study have been communicated to the practitioners. Furthermore, the next step will be to publish these findings in a reputed journal.

4. Research implications

There is a plethora of research that provides platforms for engaging with citizens to transform existing services based on their feedback. However, these studies primarily focused on the technical side of citizen engagement, and service implementation with a lack of considerations of challenges faced by local authorities during the incorporation of citizens’ feedback for continuous service improvement as discussed in sub-section 3.1 in problem investigation phase. The proposed concepts and activities in the form of a process model would provide a structured approach to the practitioners in continuously providing improved services to the citizens as discussed in sub-section 3.2 in design and development phase. This would assist them in achieving the vision of the project developed during the citizen engagement process. Such a prescriptive view ensures that services are improved based on the goals which reflect the expectations and the need of citizens.

5. Practical and social implications

This research found that the practitioners faced challenges in mapping citizens’ requirements and achieving the goals set by the existing engagement process. The results from the case study highlighted that there are multiple challenges (e.g. constraints, risks and capability) faced by practitioners when it comes to improving the services in the real environment. Furthermore, none of the existing studies considered the other side of the system i.e. local authorities who engage with citizens and work on their feedback. Therefore, it is important to know what happens once community’ feedback is with the city authorities at the Council level. How do they address citizens’ concerns? What are the challenges they face in terms of mapping their requirements? Consequently, there was a need for an approach which could consider all these factors together and provide a holistic overview of the complete system. This would ensure that realistic expectations are built within the community and city authorities can align their implementation plans based on the citizens’ feedback to meet the goals set by existing citizen engagement platforms. This study proposes a process model to encapsulate both sides of the system, one that gathers the feedback, and the other that is responsible for delivering the services (e.g. city authorities, service providers and council’s internal departments) and provides a coherent representation for providing improved services to the citizens.

6. Limitations

This study selected an offline engagement program (PPN) in Ireland as a case study under the DSR methodology to investigate the identified research problem and design proposed solution. This program gathers citizens' feedback on multiple public services. The practitioners involved in this program provided access to information about how the citizen engagement process takes place and what are the feedbacks that citizens provided on various services. Moreover, they also provided some additional documents about the engagement process and shared survey results (feedback) that was obtained from the local community. However, this study did not have an opportunity to investigate how local authorities address the community's concerns based on the feedback that is captured via online platforms. Hence, future research is required to validate the findings in another context where online platforms have been employed for gathering feedback.

7. Conclusion

Existing studies highlight the importance of citizens' feedback in the development of smart city services. There are multiple platforms and technologies to obtain citizens' feedback and to provide effective services to them. However, citizens are still unsatisfied with the services and their requirements are not fulfilled. Moreover, there is a missing link between the platforms that capture citizens' feedback, and the way services are implemented by local authorities. Therefore, there is a need for an approach that can capture this relationship, and enable the city authorities to continuously provide improved services to the citizens. This study investigated one of the community engagement programs in Ireland to understand how city authorities engage with the local community and addresses their concerns based on their feedback. This study proposes a process model based on the TOGAF ADM guidelines and the collaboration with practitioners for capturing the dynamics between citizens and practitioners while making sure that their challenges and concerns are addressed. This paper provided summary of the results from ex ante evaluation that provided validation to the identified problem and proposed solution. As a part of future work, this study aims to provide detail on ex post evaluation of the process model. Moreover, this study plan to conduct another case study based on the similar community engagement program in another County of Ireland and examine if the proposed solution can be applied in another contextual setting as well.

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