Government Digital Service Co-design: Concepts to Collaboration Tools

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Abstract: The inception of digital services is succeeded with the myriad advancements in ICT that aim to support the growing needs of users and internet-enabled devices. The diversities of these functionalities and digital services are motivated by the presence of dynamic technologies, delivery channels, and diverse user needs in an internet-enabled environment. What appropriate instruments could help to support the collaborative design and create an environment characterized by active knowledge between providers of service and end-users of the service? The co-design is a well-known approach within the design community that utilizes advanced ideas and varied instruments of co-design. This study aimed is how to identify unmet requirements for Government to Citizen (G2C) e-service design and significant ways of achieving the requisite design needs using a suitable design process? Detailed interviews were undertaken with three groups of stakeholders in regards to the service design. This study analyses the data collected using an inductive thematic analysis to analyze qualitative data collected from study participants. This study also explores the patterns resulting from the G2C e-service design process and further establishes the interconnection between the processes in regards to fostering the effectiveness and efficiency of the services.

1 INTRODUCTION

e-Government service suppliers should ideally emphasize on what makes service users gratified in their daily life and work, reducing centralization procedures in government agencies and organizations (Cordella and Tempini, 2015). In contrast to commercial services, government digital services are typically developed by internal service providers and often neglect the service end-user (Axelsson and Melin, 2007; Bridge, 2012). Therefore, the delivery of services might be endangered without due concern of the service users, deficient consideration of their needs and prospects in the design process (Wu et al., 2013; Zhao et al., 2008). The consequence of this challenge is a failure of e-Government projects and a lack of trust in e-Government services; particularly in developing countries (Kim et al., 2019; Choudrie et al., 2009). Limited user involvement throughout the design process of e-Government services is typical practice (Anthopoulos et al., 2007; Olphert and Damodaran, 2007).

Nevertheless, Heeks (2003) acknowledges the existence of a high failure rate of e-Government particularly among nations categorized as unindustrialized or undeveloped. Further findings reported by Heeks indicates that at least 35% of the governmental projects have failed completely, which is coupled with an estimated 50% failing partially. The figures eclipse the success of the proposed projects that is only 15%. The challenge of failing projects has attracted scrutiny and opposition due to missing trust and credibility among service providers and consumers of the e-Government services (Twizeyimana and Andersson, 2019). Besides, among the developing nations, the mandate of providing eGovernment services is offered by service providers internally who have a tendency of neglecting the concerns of those consuming those services. Most importantly, Wu et al. (2013), and Zhao et al. (2008) note that service delivery is threatened as the users are not taken into consideration in terms of their diverse needs and expectations form the service framework process.

The challenge of disregarding the users of e-Government services indicates that providers are cushioned by the marginal of the services provided that limits them from meeting the needs of the service users. Thus, this study aimed to identify unmet requirements for Government to Citizen (G2C) e-service design and significant ways of achieving the

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requisite design needs using a suitable design process. This marks the need to bridge the gap differentiating these two key stakeholders. Therefore, this study adopted a relatively known 'co-design approach' to enable the government to align a collaborative relationship between users of services and providers for the benefit of the citizens (Bridge, 2012). As a provider of services, the application of this approach aims to improve the involvement of services in terms of participating and collaborating activities with providers of service.

This paper presents a theoretical "design-led" contribution from a digital service design study (see figure 4). Co-design is well realized in the design environment with some innovative and wide-ranging co-design tools and methods (Zheng et al., 2019). The paper starts with theoretical government background literature, service design methodologies and subsequently leads to the solution space encompassing co-design techniques.

The main aim of this paper is to identify unmet requirements for Government to Citizen (G2C) e-service design and significant ways of achieving the requisite design needs using a suitable design process. Accordingly, Sanders and Stappers (2008) expound on the implications that result from incongruences between service design requirements and the service design activities. Some of the mismatches include the threat of recording decreased benefits from the entire design process.

The purpose of this paper is to establish the advantages of co-design approaches present in design environments that are molded to facilitate the wide-range activities undertaken by stakeholders. The activities are hinged on a pledge to be delivered alongside practical benefits linked to an e-service design. The next section expounds on numerous theoretical background literature on e-Government service. The subsequent section will provide a discussion on the research methods including the research phases employed in this paper. The last section will detail a case study on fieldwork testing. In terms of the conclusion, this paper will provide a summative discussion on the significant sections tackled on the subject of e-Government services.

2 E-GOVERNMENT BACKGROUND

2.1 e-Government Services

Citizens are entitled to access and enjoy e-Government services with ease. Moreover, the citizenry has the right to have reliable e-Government services to foster their interactions with varied e-Government engagements, such as Government to Government (G2G), Government to business (G2B), and lastly, government to employee (G2E) services (Choudrie, et al., 2009). However, it is vital to note the experiences of the populace due to the failure of e-Government services that are marred with problems evidenced by unmet desires. The challenge of these aspects that cause the e-Government failure is present among the emerging nations. The course of reviewing the significance of the e-Government and exploration of aspects that dictate the creation of e-Government has received growing support among communities that tend to analyze e-Government (Scholl, 2014).

This paper focuses on G2S services and the ways the government employs to provide services to the populace. Examples of these services include tax collection, the execution of welfare payments, conducting the process of renewing licenses and passports, and facilitating government agencies as well as taking a lead role in the provision of social and healthcare services (Fogli and Provenza, 2012). Concisely, the provision of G2C e-services is a task assumed by service suppliers, which have been creating the challenge of overlooking the requisite needs of the service's users. (Heeks, 2003).

The implications of these unmet needs have elicited numerous socio-technical challenges coupled with the absence of programming skills. The role of e-Government is to reduce the gap in the requirements between the government and citizens through an interactive process exemplified with the provision of effective and superb online services. The presence of these expectations is key in encouraging citizens to use the services (Fogli and Provenza, 2012; Scholl, 2014). The question that is often directed to the G2C services is: "Which is the essential requirement needed to foster the understanding during the formulation and creation of the appropriate process of e-services?" The resultant outcome is that service delivery is often negative without the consideration of the service users. Nevertheless, in terms of addressing the requisite needs of the G2C e-services, it is vital to note that limited staff working for the service providers, such as consultants recruited for the e-services design demonstrate the right knowledge for this task.

2.2 e-Government Services in Pakistan

In the context of Pakistan, the e-Government service was championed in 2002. The inception and

execution of the e-Government service was commenced as a department within the Science and Technology Ministry. The department had been tasked with the role of monitoring diverse e-Government projects and ensured that they adhered to the established practical guidelines (Warriach and Tahira, 2015). The main role of the e-Government was centered on the provision of support to organizations tied to the public sector. The roles were modeled and expected to enhance productivity, efficacy, and transparency using ICT and ensure that the end-users access the services with ease (Ovais Ahmad et al., 2013). As an integral sector in the Pakistan context, ICT helped in the development of e-Government services. The government was concerned with providing varied activities that were focused on improving the lives of people. The feasible strategy adopted by the ICT was key in reinforcing the achievement of the reformed social and economic aspects. Therefore, the development of robust ICT helped to highlight the improvement of the e-Government services accessed by the citizenry (Ali et al., 2018).

Pakistan is categorized under emerging nations. Correspondingly, Pakistan has its share of e-service problems that involve the acquisition of moderate ICT infrastructure, the presence of low levels of literacy, demographic factors, and relative dwarfed development of e-Government services, and technological challenges (Ovais Ahmad et al., 2013; Chandio et al., 2018). Additional challenges notable in the Pakistan context are issues with the privacy of data and the dissatisfaction of the services rendered e-government that is demonstrated between providers and end-users. Similarly, Almakki (2009) acknowledges the challenges and difficulties of e-Government services that are experienced among emerging nations that are often experienced at the developmental of the services. Qaiser and Khan (2010) echo the findings reported by Almakki (2009) by outlining numerous restrictions that include: inadequate ICT facilities and poor implementation process that limits the significance and advancement of e-Government services (Ali et al., 2018).

2.3 Design Methodologies

User-centered design (UCD) methodologies were established in 1970 and ultimately became accepted widely and adopted in 1990 (Sanders and Stappers, 2008). Handler outlooks and concepts are merged into the software improvement progression regularly to ensure a better system or service deployment (Wever, et al., 2008). UCD emerged as being greatly suitable in designing and developing products for end-user (van Velsen and van der Geest, 2012; Jacobs et al., 2019). Figure 1 explains a caricature displaying the deficiency within the classical user-centered process of design compared to the co-design approach, and the rationale for transforming to co-design approach. Sanders and Stappers (2008, p.11) stated “the user is a passive object of study, and the researcher brings knowledge from theories and develops more knowledge through observation and interviews”. Moreover, “The designer then passively receives this knowledge in the form of a report, and adds an understanding of technology and the creative thinking needed to generate ideas, concepts, etc.” (Sanders and Stappers, 2008, p.12). Nevertheless, an analysis is critical to mentor participants at the ‘performing’ level of creativity, supporting at the ‘adaptive’ level, supporting platforms for resourceful manifestation at the ‘innovative’ level, and suggest a delicate account at the ‘designing’ level (Sanders and Stappers, 2008). Nevertheless, an analysis is critical to mentor participants at the ‘performing’ level of creativity, supporting at the ‘adaptive’ level, supporting platforms for resourceful manifestation at the ‘innovative’ level, and suggest a delicate account at the ‘designing’ level (Sanders and Stappers, 2008; Simonofski et al., 2019).

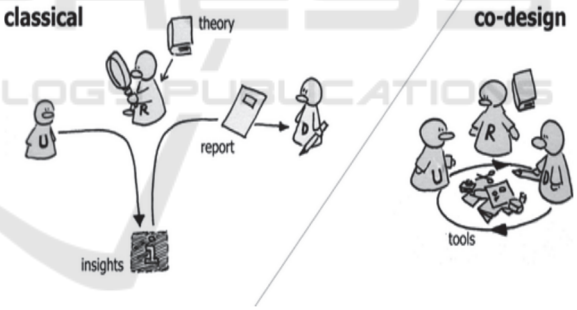

Figure 1: Classical UCD VS Co-Design (Sanders and Stappers, 2008).

2.4 Double Diamond Model (DDM)

The Double Diamond model (DDM) can be defined as an basic graphic plan of the process of design as a creative process (See figure 3) distributed into four separate stages (Discover, Define, Develop, and Deliver) representing a typical design process phase (British Design Council, 2005). These creative processes reflect various potential ideologies before refining (i.e. divergent ideas) and narrowing down ideas to the most suitable ones (i.e. convergent ideas). DDM designates these four stages to work together as a map design providing guidelines for the

organization of thoughts in order to improve the creative process (JustInMind, 2018). The creative process is an iterative process (not a linear process), which implies that the specific ideas are developed, tested, refined several times to match diverse thoughts and perspectives of stakeholders; weak ideas are omitted in the design process (British Design Council, 2005).

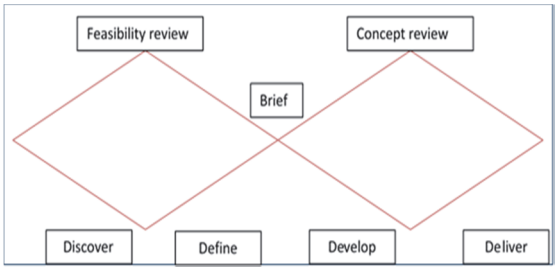

Figure 2: The presentation of the Double Diamond model (UK Design Council, 2005).

3 RESEARCH METHODOLOGY

3.1 Data Collection and Sampling

In-depth interviews were used to collect the views, ideas, and thoughts from the research subjects, which helped to categorize G2C e-service design requirements. Evidence from studies conducted has reported that the use of a small sample population, such as between 5 and 50 respondents was sufficient enough to record a wide range of requirements (Dworkin, 2012). Study participants recruited for this study were selected purposively. As demonstrated in Table 1, the purposive sampling approach was employed to recruit the study participant by reaching out to the potential respondents. Siau et al. (2010) emphasize on the need to utilize an appropriate sampling approach to ensure that different respondents with diverse experiences are recruited in a study.

This study focused on recruiting stakeholders identified as users of service, and frontline staff along with service providers. The author chose to use interviews since they offer a chance to delve deeper into the subject being researched, compared to using surveys (Bell and Nusir, 2017). Cumulatively, the author carried out 24 in-depth interviews that last from 45 minutes to one hour. Nonetheless, the author guaranteed that the experience and familiarity of all the respondents with the area of investigation (i.e. G2C e-service design process) was sufficient. All the interviews began with a brief summary of the questions in the interview (open-ended), to ensure the respondents understood the areas being investigated. Subsequently, the interviewing protocol and guidelines including additional questions were explained to participants as an introduction as a way of facilitating the interviewing process. After a brief introduction about interview protocol, service users were supposed to answer questions about their experiences -What/how do you wish to contribute and/or enhance your experience with services and service outcomes? Service providers and frontline-staff were interviewed on prevailing processes of design - Which steps are followed by e-Government projects in Pakistan when creating government to citizen (G2C) services? This study presents data analysis and results findings from the comprehensive interviews in sub-sequent section.

Table 1: The sample population for the in-depth interviews.

Stakeholders	Participants Category	# participants
Service Provider	*NITB	6
Service Frontline-staff	**PITB	6
Service User	varied & diverse Background & Experience	12

3.2 Data Analysis

The translations of the interview transcripts were exported to Spreadsheets for data cleaning and management. This study used the inductive thematic analysis method to analyze the grouped transcripts of the research subjects. This process was followed with the compilation of all the transcripts in a single file and the analysis of the data executed conducted using the inductive thematic analysis, which is one of the popular methods used in qualitative data analysis. The rationale for selecting this method was due to its accessibility and flexibility. Additionally, there are no major limitations that are tied to any specific theory as the method works with diverse and changing occurrences. Accordingly, the description of the study's dataset was rich with a throughout interpretation procedure (Braun and Clarke, 2006).

The procedure for the thematic analysis method was undertaken in six key phases as elaborated by Braun and Clarke (2006). The first step involved familiarization with the data, which involved going through the data numerous times to achieve a

comprehensive understanding. The second step involved the development of the initial analysis from the transcripts. This step involved the consideration of the key points that tended to be significant in the examination of the study interviews (Allan, 2003). The third phase involved sorting the initial relevant transcript codes in a bid to identify potential categories resulting from the interviews. Potential themes were reviewed in the fourth phase. This phase involved the process of reviewing and refining potential categories to ensure that high levels of consistency are maintained. The fifth step involved the definition and classification of the categories derived from the fourth phase using appropriate titles. The last phase involved the identification of the satisfied categories and using them to discuss the study findings in a clear and convincing way.

This study derived 30 requirement labels. The four categories identified involved the service conception, explanation and organization of service, development, and deployment of the service, and service unveiling and implementation. The categorization of the labels into four groups was undertaken for all the 24 stakeholders involved in the study.

3.3 A Tailored Double Diamond Model

The tailored diamond model (DDM) used in this study proposed varying weights for the mentioned stages (Ruhl et al., 2014). Figure 3 is a representation of the DDM, which is a version redesigned from the Double Diamond model and the Double Diamond Model of Product Definition and Design (Hinman, 2012).

The consideration of the varying weights and stakeholders is documented for the different stages, which is dependent on the shared interests, tasks, and requirements among the groups. The stages are retitled appropriately to ensure that they match with the expectations of the c-design strategy. As such, discover was retitled to co-discover. The first two stages, co-discover and co-define demonstrate a significant process of definition; whilst the last two stages consisting of co-develop and deliver indicate the process of the design.

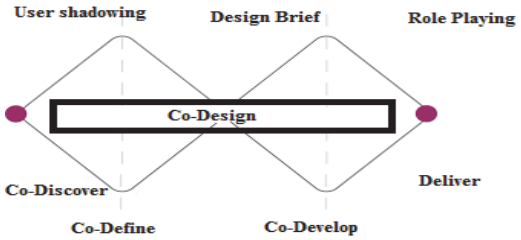

Figure 3: The Tailored DDM.

The figure above is a representation of the divergent and though mode that is connected with interview results. The classification of the G2C's requirements and categories are showcased in Figure 4.

The systematic process outlined in Figure 4 spells out the stakeholder groups that are mapped into appropriate categories that relate to the DDM phases. The systematic process further outlines the key components of defining each stage of design that matches with the corresponding roles and definitions purposely to achieve the goal of each design phase (British Design Council, 2005). It is vital to note that co-define, co-develop, and co-discover are different and do not relate to each other due to the fact that they are found within the stages encompassing the engaged and the stakeholders.

The Business Process Modelling Notation (BPMN) denoted in Figure 4 was useful in the creation of the tailored DDM that ensured that suitable design tools were utilized in the design phases. Whereas the BPMN was modeled to operate internally, it provided a platform for engaging diverse stakeholders. The three co-design stages are discussed as follows:

Co-Discover: This is the first stage in the co-design stage, which is notably identified as the scoping and service initialization. As such, the design problem was identified in this stage. Moreover, this stage was characterized by a wide range of activities, such as procedures, support activities, and

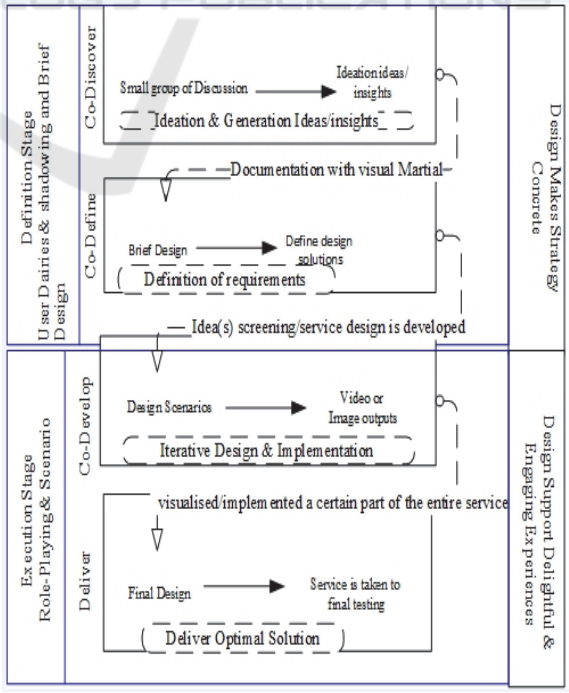

Figure 4: Co-Design Framework.

instruments that are used to generate thoughts, opinions, and views from participants.

Co-Define: This is the second stage where ideas are filtered from information collected from participants. The synthesis of ideas at this stage further involves reviews and eliminations and used to recommend solutions that are design-led. The implication of this stage explains the need for analyzed and synthesized design ideas that are dependent on the requirements stipulated in the design brief.

Co-Develop: At this stage, the G2C e-service participants are first introduced to the solution led by design (Design Council, 2007, p. 19). The purposes or resolutions for designing the process of G2C e-service are expounded in this phase. The development of the resolutions is key to the demarcating the requisite objects for the design methodology.

Deliver: This last stage provides the platform for testing service. This stage which is also known as the service unveiling and implementation involves the objects that are a resultant of the previous stage. The implementation and the delivery process involve the relationship that required from the inner design staff only.

4 DATA RESULTS-KEY CATEGORIES

The main categories identified were based on frequency as the criterion indicator. Notably, Goffin et al. (2006) acknowledge that frequency as one of the vital indicators. The rationale for selecting this criterion emanated from the reviewed literature that stipulated how frequency was important such that a minimum of 25% formed the baseline for the participants. The overwhelming mention of the frequency is an indicative factor that this category was candid as demonstrated in Figure 5. Nevertheless, it was difficult to determine the category that was significant given that the results were not 100%. As such, identified categories are as follows:

4.1 Service Deployment

The formulation, creation, and deploying services forms one of the vital categories alongside the stakeholder groups. Given that the resulting frequency was 27%, this category is significant when compared to the group of service providers. Moreover, this category offers significant attributes to the users of the service and the group consisting of front-line service staff. The significance of this category is characterized by diverse classifications of the individual stakeholders who are tasked with the responsibility of making decisions of the requirements within this category.

4.2 Service Launching and Updating

This category which is 15% comes last in terms of frequency when compared with other groupings. The explanation for this significant difference is that the prospects of launching and updating the service happen continuously as the services work on organizing the services with the intention of meeting the diverse needs of the end-users. The requirements are elicited from the expectations from stakeholders using the service and the responses from the service frontline staff. As an integral component in the service development, this category demonstrates that it is only significant to the group of service providers and not the other groupings.

4.3 Service Delineation and Organization

This category comprises of the responses, which estimated at 25% of the frequency when compared with the other groupings. The responses are derived from the stakeholder groups, which demonstrates a high significance towards other groups. However, this category ranked a low significance in the services providers groups. Similarly, the categories consisting of the users of service, as well as the frontline staffs, are ranked highly as exhibited by the frequency scores. As such, decision-makers need to take into consideration vibrant requirements by restructuring the current service design model.

4.4 Service Inauguration and Scoping

This category which accumulated 21% of the frequency of mention fails to showcase the integral significance, which other categories can depend on. Evidently, this category is built on the assertions and viewpoints collected from the service frontline staff. This reveals how government staff exhibit the highest correspondence in the event a service has design glitches that result from the daily usage of the service by the end-users of the service. Conversely, this category signifies a modest standing when compared with the other groupings based on mention frequency.

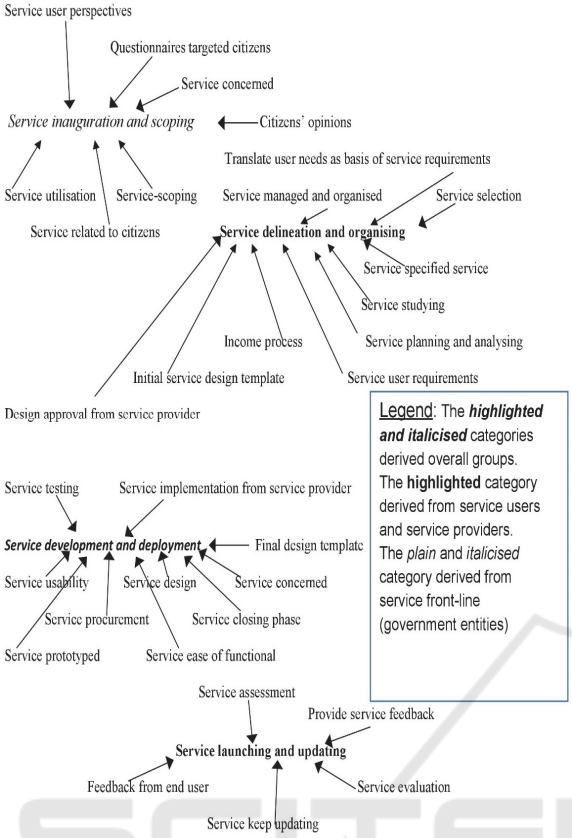

Figure 5: Cognitive Mapping.

5 CO-DESIGN FRAMEWORK - FIELDWORK TESTING

A qualitative research method was conducted and led by author (i.e. predetermined interview questions using the focus group discussions (FGDs) as form of semi-structured interviews) with total of 24 participants recruited to participate in this study. The involvement of the participants was hinged upon to generate intriguing, appropriate, and subjective information, such as their experiences with the design G2C e-service. In the Pakistan context, prototype evaluation and post-test interview questions and tasks were administered to the participants to validate the proposed framework. Co-design Wiki is an innovative workspace-platform (see figure 6). The innovation workspace was produced by realizing several features (core functions) as these functions explain four phases of the typical design process. For example, generating checklists for possible services, creating an account, upload media that informs design, search, a toolbox including options and text boxes for providing feedback on the service design process. Furthermore, rating and voting features grant participants the opportunity to assess the service design characteristics. The FGDs with the participants lasted between 45 minutes and 60 minutes. Study participants were encouraged to collaborate in task-based planning. As such, they were required to provide answers to the semi-structured questions, which were formulated to assess their adequacy.

Figure 6: Online collaborative Co-design Wiki.

The three main themes resulting from this study, namely, Creativity and collaborative platform, Situating and tailoring co-design tools; and limitations and shortcomings of involvement. Moreover, the six subthemes resulting from the study can be identified as follows: demonstrating engagement, communication, originality, design instruments of a collaborative nature, interaction and some advantages and disadvantages. The collective themes demonstrated varying comparisons in terms of the groups of the service provider and users of the service among the other groups. However, the groups showcased diverse viewpoints that included the opportunities and difficulties of using a proposed prototype that comprised the end-users in the process design. The findings were identified using inductive thematic analysis as an example of theoretical analysis for the FGD's answers. The three major themes and sub-themes from the study were identified and explained as follows:

5.1 Creativity and Collaborative Platform

This platform was presented with positive reports drawn from the experiences of the participants who had interacted with the proposed prototype. Some of the participants even identified the proposed

prototype as intriguing. It is vital to note that the frontline staff took part in the entire assessment process. However, there are numerous participants who revealed the significance of collaboration with the exception of one participant who reported the need to improve the prototype's interface. The significance of this theme is exhibited as it emerged from the merger of two themes, namely, user communication and involvement, and cooperation co-design platform.

5.2 Situating and Tailoring Co-design Tools

Participants from the groups dominated by the frontline staff took part in the assessment aimed toward the improvement of the diverse stages of the iterative design process. Accordingly, the involvement of this group was geared towards making most of the opportunity to present ideas on the process of designing e-services. The previous suggestion sought by the frontline staff groups received a warm reception among the groups of the service provider. Nevertheless, the main objective of the groups was to position the co-design tools in all the design phases purposely to enable diverse stakeholders to modify their varying viewpoints.

5.3 Limitations and Shortcomings of Involvement

The adoption of design instruments differed throughout the design phases. For instance, the frontline staff groups demonstrated higher levels of interest when compared with other groups of the service provider. However, there were notable limitations that were evidenced by the service provider in regard to the participation of users of services. The challenges were evidenced through the design process of the services due to the lack of knowledge and experience. Evidence from groups like the frontline staff showcased wide-ranging opportunities through which they could reduce the fears of supporting the participants in a more effective and timely manner. Moreover, the frontline staff groups did not originate from the service providers.

6 CONCLUSION

This study has provided a significant co-design activities emerge from a diverse set of service design stakeholders (see figure 4). Identified themes and related sub-themes (see figure 5).

Underpin our blueprinting process construction and subsequent technique selection. Author describes a design study where co-design is utilized in a participant (stakeholder group) specific e-Government service co-design process. Working with several e-Government stakeholders in Jordan. Elements of participant and stakeholder group cognitive models were then synthesized into a context-specific co-design blueprint, itself based on the UK Design Council's DDM. The 'co-develop' and 'co-define' stages demand convergent thinking to stimulate diverse stakeholder groups to identify the concrete strategies for managing and planning alternative practices by synthesizing the problem. In contrast, the co-discover stage needs more divergent thinking, covering different stakeholders for more robust exploration in the problem phase. The blueprint was then operationalized (as a practical process model) to elaborate on the specific service design steps.

Moreover, it is supporting the designate tools needed for effective service co-design usage. The operationalized design process offers an executive approach that can be utilized to develop e-services in a governmental domain-context. Remarkably, the discursive nature of our collaborative process and the rating tools employed were particularly popular amongst stakeholders.

This study had a number of limitations primarily linked to a focus on a single context. Participant numbers are small and issues are likely to have a context specific nature. Consequently, the findings may not be generalizable, but design oriented qualitative research provides depth, effectiveness and transferability rather than generalizability. Future research could determine the extent to which different stakeholder groups are influenced by the size of task ahead. It may also be the case that this is linked to the historical experience of each stakeholder.

Based on the findings from this study, the recommended approach is the co-design framework for the G2C e-service for its effectiveness in mapping out the tailored requirements. Additionally, co-design deems appropriate as it is integral in the selection process mechanism as well as matching e-Service design categories with relevant design methodologies throughout the phases of the process design. Therefore, the implementation of this approach will foster communication among key stakeholders involved in the design process for the G2C e-service.

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