Reflections on Collaborative Design: Lessons from Creating a Digital Public Service App.

Elaine Venson[a*], *Julia* de Souza[a], *Sara* Campos[a], *Rejane* Figueiredo[a], *George* Marsicano[a], *Wander* Pereira Silva[a],

[a]Information Technology Research and Application Center (ITRAC), University of Brasilia (UnB), Brazil, elainevenson@unb.br, 0000-0002-7607-5936)

Submitted: 31 January 2025, Revised: 26 March 2025, Accepted: 21 April 2025, Published: 26 May 2025

Abstract. Digital Transformation in public services requires a comprehensive understanding of the value creation to improve services and government operations. Designing digital public services is challenging, but Service Design methods can help achieve services that align with democratic values like accessibility, reliability, and a positive user experience. This article reports on the collaborative design of a mobile app for a regulatory agency in Brazil, using co-creation, co-design, and co-production methods through two workshop cycles. The first cycle, based on Lean Inception principles, defined the Minimum Viable Product (MVP), while the second cycle, utilizing Design Sprint techniques, refined and tested the MVP with citizens. Feedback from users and public servants is also shared, emphasizing the importance of involving citizens and government employees in developing public service solutions.

Keywords. Digital Public Services, Collaborative Design, Lean Inception, Design Sprint, User Testing, Prototyping.
Practical report, DOI: https://doi.org/10.59490/dgo.2025.1044

1. Introduction

Digital transformation has reached the public sector, with government agencies aiming to harness its benefits. Successful initiatives highlight the importance of designing a great citizen experience (Mergel et al., 2019b). Approaches like co-creation, co-design, and co-production have been used to engage stakeholders and citizens in the digitization of public services (Figueiredo et al., 2024; Scupola & Mergel, 2022).

According to Luna et al., 2024, citizens perceive the value of digital public services when they are accessible, reliable, user-friendly, intuitive, and provide clear instructions, complete information, and easy tracking of requests. Meeting these expectations is challenging and requires integrating user-centered approaches into the software development process (Szabó & Hercegfi, 2023).

In this paper we show the experience of a Brazilian regulatory agency in the health sector in designing a digital public service centered on the citizens, with special focus on elderly users. The service aims to provide simple and straightforward access to relevant information for citizens, while also enabling them to file complaints about the regulated entities that they believe are violating sector regulations. This dual functionality ensures both accessibility and accountability, promoting the proper functioning of the health sector.

Two workshop cycles were held with public servants and included citizen participation in the final stages. The first, in October 2023, used an adapted Lean Inception to define a Minimum Viable Product (MVP). The second, in March 2024, applied Design Sprint techniques to enhance the MVP by designing and testing a prototype with citizens.

The report is organized as follows: Section 2 outlines the collaborative design context and motivation within the government agency. Section 3 describes the methods used for the design process. Section 4 discusses the challenges faced and their impact. Section 6 presents the results and outcomes. Section 7 shares lessons learned, and Section 8 concludes with key findings and future work directions.

2. Context and Motivation

Digital Transformation in Public Services requires holistic efforts to understand the value creation process when using technology to provide services for citizens (Mergel et al., 2019a). Co-design and Co-production can both help in collaboratively understanding viable value propositions and designing better government services (Osborne et al., 2016, 2022; Strokosch & Osborne, 2020).

The experience we report in this paper is an example of collaborative design where a government agency from the health sector in Brazil is working to enhance an existing service. At present, the service is primarily provided via a toll-free 0800 number, ensuring that citizens can access assistance without incurring any costs.

In 2020, the agency received around 270,000 information requests and 150,000 complaints, with a resolution rate of over 90%. However, the service is mainly human-operated and conducted by telephone. Citizens can also access the service through the agency's website or mobile app, but many report difficulties navigating the website, citing confusing language and complex navigation. The existing mobile app is also criticized for poor usability, as one agency employee remarked, "If we, who are from the agency, have difficulties accessing the app, imagine the user who doesn't have much knowledge?"

To improve service delivery to citizens, the agency partnered with LabQ Gov.br[1]—a government lab focused on experimenting and redesigning digital public services. In collaboration with the authors' lab, they applied UX, Citizen Experience, and Service Design methods to identify opportunities for improvement and innovation in federal government services.

The project's goal for the agency was to develop an application for citizens using health services, offering personalized information to improve their understanding of available services and empower them to make informed decisions about health plan options in Brazil.

3. Approaches and Methods

The collaborative design initiative employed activities from both Lean Inception and Design Spring approaches, detailed in the following subsections.

3.1. Lean Inception

Lean Inception (LI) is a collaborative method supported by principles from Lean Startup and Design Thinking (Caroli, 2018). LI proposes that the participants work together to comprehend and elaborate the MVP. LI works with an incremental iterative logic, where small parts of the product (MVPs) are gradually added to the whole in order to test hypothesis (Caroli, 2018).

LI method is usually conducted through a week and follows eight activities: 1. Product Vision; 2. Scoping; 3. Personas; 4. User Journeys; 5. Brainstorming of Features; 6. Analysis of Features Values; 7. Sequencing Features; and 8. Canvas MVP. (Ferreira et al., 2021).

The initial activities of the workshop seek to align the participants about the context and define the goals of the product or service (Lobão et al., 2023). First, the Product Vision helps to structure the product's focus and what is the strategy, ultimately defining the essence and the values the company wishes to pass to the user. Then, at the Scoping moment, the product is defined by characteristics of what it is/is not and what it does/does not do; and by the objectives. At the end of these activities, the team is much more aligned towards the goals of the product/service (Caroli, 2018).

[1] https://www.gov.br/governodigital/pt-br/estrategias-e-governanca-digital/transformacao-digital/central-de-qualidade/labq

At the following moment, Personas and User Journeys are established, which moves the focus from business strategy to the user perspective. This phase allows the team to create empathy and understand the pains and necessities of costumers. While personas represent a realistic vision of roles and goals of users, a user journey specifies tasks the system must execute to help them (Caroli, 2018; Ferreira et al., 2021; Lobão et al., 2023).

After that, the Brainstorming of Features tries to answer the questions: "*What must the project have to resolve the user's necessities? What features must the product have to fulfill it's goals?*" (Caroli, 2018). These features are evaluated in the Analysis of Features by their level of effort, business value, user experience (UX) and developer's confidence to implement. This classification helps prioritize the features (Caroli, 2018).

With the level of complexity and business and UX values defined, the team is able to conceive the Feature Sequencer. In this step, the MVP is finally stipulated from combining enough features to validate a hypothesis. Ultimately, the Canvas MVP is generated by all the information gathered in the workshop (Caroli, 2018).

3.2. Design Sprint

Google Design Sprint (DS) is a collaborative design strategy based on Design Thinking and Agile methodologies. Design Sprint offers a five-day long structured process that focuses on not planning much ahead and failing rapidly, so the team can learn at every iteration (Knapp et al., 2016; Lárusdóttir et al., 2023).

Usually, the five stages of the process are divided in five days: (a) Map; (b) Sketch; (c) Decide; (d) Prototype; and (e) Test. The input of the DS methodology is a Challenge, and by the end of the process the output generated is what is Learned, the knowledge assembled. By the end of the DS sessions, the solution is set, anchored on the knowledge, strategy and ideas of the team, and the product or service can go on to the next phase, implementation (Lárusdóttir et al., 2023).

On Monday, the team maps the service and how the costumer interacts with it. Then, by the end of the day, a target problem for the workshop is chosen within what was mapped. Tuesday begins with a consultation of existing ideas using the Lightning Demos technique, consisting of three-minute presentations by each member about their favorite known solutions; then, each participant create their own sketch of the solution, a storyboard of three steps.

Wednesday starts with deciding which solutions resulted from Tuesday are more aligned with the goal, using a voting system. Then, the teams builds a more detailed storyboard of the system to help creating the prototype on the next day. On Thursday, the focus is building a high-fidelity prototype, so that by Friday it is used to test with real users. The users are invited to be interviewed, they are contextualized, shown the prototype, given tasks to achieve using the product and lastly asked some questions such as what they liked most/least or what worked for them (Knapp et al., 2016).

4. Challenges Encountered

While LI and DS approaches have reached success in industry, their use offers some challenges when applied to improve digital public services.

Both approaches, LI and DS, require a full five-day week for a team to complete the activities. A key challenge in applying these methods in a government context is securing a team of civil servants who can dedicate such a substantial amount of time exclusively to the project. Typically, the most knowledgeable individuals in the agencies are the least likely to participate in these activities. This difficulty led us to gather as much information as possible about the service and focus on the activities that were deemed essential, aiming to extract the maximum value from the approaches for the project. We also used on-line forms to collect information from the workshop participants after the session when necessary.

Another issue impacting the project was the large number of stakeholders appointed to participate and contribute. On the first day of the initial cycle, 19 civil servants from various areas were present. While the diversity of areas is an important factor for innovation, it also presents challenge in working effectively to achieve the initiative's goals. While planning the workshops, we adopted a strategy of dividing the participants into two groups to work on the activities. Subsequently, we consolidated the results into one single outcome.

Original LEAN INCEPTION AGENDA

	MON	TUE	WED	THU	FRI
MORNING	Kick off	Persona	Tech, UX & Business Review	Journey & Features	MVP Canvas
	Product Vision				
	LUNCH				
AFTERNOON	Is – Is Not Does – Does Not	Features Brainstorming	User Journeys	Sequencer	Showcase

Adapted LEAN INCEPTION AGENDA

	DAY 1	DAY 2	DAY 3
AFTERNOON	Kick off	Persona	Journey & Features
	Problem Statement		
	Product Vision	Features Brainstorming	MVP Canvas
	Is – Is Not Does – Does Not	User Journeys	Showcase

Fig. 1 – Original Lean Inception Agenda (adapted from Caroli, 2018) and Adapted Lean Inception Agenda (from authors). Gray cells indicate removed activities and orange cell indicate the added activity.

Additionally, the participants were spread across multiple locations in the country, making it difficult to assemble everyone in one place. Consequently, a restriction for the initiative was that it had to be conducted remotely with all participants attending virtually through a conferencing tool. For promoting the active contribution of the participants in the activities we used Miro[2], an online collaborative whiteboard platform designed for team collaboration.

5. Solutions and Strategies

The challenges described in the previous section conflict with the recommendations from the LI and DS approaches. This section outlines the solutions and strategies we used to adapt these approaches to conduct the project in light of the challenges faced.

5.1. Lean Inception Adaptations

Figure 1 presents both the original and adapted agendas of LI, where the gray cells indicate removed activities and orange cell indicate the added activity. The original LI agenda spans a full five-day week, while our proposed agenda was condensed into three full afternoons. Most of the LI activities were retained, albeit with shortened execution times.

In this case, we also utilized an online questionnaire to gather specific data that could not be obtained during the workshops. As a result, participants were required to make an an additional effort outside the workshop.

Two original activities were removed: the Tech, UX & Business Review, and the Sequencer. These activities are structured methods for performing feature prioritization. Due to time constraints, we conducted the prioritization in a more informal manner, like using the voting feature of the Miro board tool.

Originally, LI starts with the Product Vision, but a new activity, the Problem Statement, was introduced at the very beginning of the workshop. Given that this project involved a large team of civil servants from different areas from the agency, each with distinct perspectives on the problem, it was decided that including activities to get a consensus on the problem would be definitive in converging towards a solution within a shortened time-box (Ferreira et al., 2021). As in Ferreira et al., 2021, we noticed that by starting with a scope defined we could reduce the time spent in the Product Vision activity and have a more oriented discussion.

[2]https://miro.com

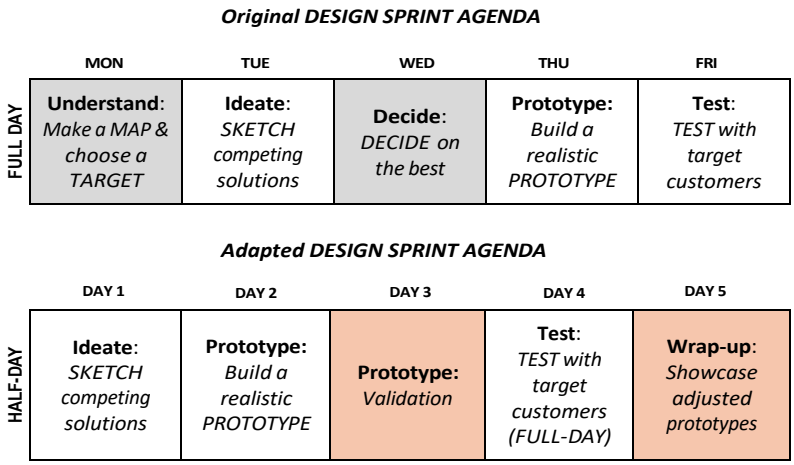

Fig. 2 – Original Design Sprint Agenda (adapted from Knapp et al., 2016) and Adapted Design Sprint Agenda (from authors). Gray cells indicate removed activities and orange cells indicate the added activity.

To manage the large number of individuals attending the workshops, some activities were executed in two steps. In first step, the group was divided into two breakout rooms within the conferencing tool to discuss the matter in smaller teams. Afterward, the entire group reconvened, and a representative from each breakout room briefly presented their group's conclusions. These conclusions were then consolidated into one shared result.

When dividing the groups, care was taken to compose the room with individuals from different areas whenever possible. One member of the facilitation team supported each group during discussions.

5.2. Design Sprint Adaptations

Similar to Pelinson and Campese, 2023, in a public service context of digital transformation, DS was adapted to be conducted remotely and with participants that included civil servants.

Figure 2 presents both the original and adapted agendas of DS. Gray cells indicate removed activities and orange cells indicate the added activity. The original DS agenda spans a full five-day week, while our proposed agenda took four full afternoons and one full day for the testing with users.

Since the user journeys and features were previously defined in Cycle 1, the Understand activities from Monday and the Decide activities from Wednesday were not necessary. The remaining days of the original DS agenda were used to sketch ideas for the MVP features, build and test the prototypes.

The agency required the development of high-fidelity prototypes. Therefore, two designers collaborated with the agency team to deliver these prototypes, using Figma[3], a web-based design tool used for interface design, user experience (UX) design, and collaborative design projects. This decision necessitated adding one additional meeting for prototype validation before the user test, as well as a final activity to present the adjusted prototypes after the user testing.

Due to the workshops being run remotely, a hybrid solution was planned to conduct the test the new solution with the citizens. The tests were conducted at one of the agency's service center. After a citizen was attended to as usual, they were invited by the civil servant to participate in the tests for the new solution. The facilitators conducted the test in a separate room. The workshop participants, who were located in other cities, observed the testing sessions through the conferencing tool from two perspectives: (1) they could see the and hear the user through the camera and microphone, and (2) they could see the user navigating the prototype through the screen sharing feature on the mobile phone used for testing. While observing, the sprint participants were asked to take notes on the perceptions of the user for each screen or features analyzed.

[3]https://www.figma.com/

6. Conduction of the Workshops

The workshops were planned and facilitated by three of the authors, with the support of LabQ.

The first cycle of workshops, based on the LI method, was conducted in October 2023 and produced the MVP for the app. Initially, two afternoons were planned for the complete execution of a Lean Inception (Caroli, 2018) workshop to establish the initial parameters for constructing a Minimum Viable Product (MVP) of a mobile app. The MVP aimed to synthesize a unified vision from the collaboration between various stakeholders of the agency.

At the beginning of 2024, the public agency realized that they needed a prototype to pitch the project and allocate the budget for its development. Consequently, a second cycle of DS workshops were conducted in March 2024 to prototype and test the solution with citizens prior to the initiation of the software development project.

6.1. Cycle 1 - LI Workshop

LI workshops can be very beneficial, as they enable the development of experienceable products with minimal effort, enabling customers and users to early validate the product without the need for further development (Zimmermann et al., 2021).

The goal of the LI workshop conducted was to establish parameters for developing the app's MVP by consolidating a shared vision through the involvement of stakeholders from various areas related to the service. In this first cycle 19 stakeholders from various areas were involved.

The first day of the LI workshop started with gaining a better understanding of the citizens' problem when using the agency services. A set of insights was collected to identify the users' issues and needs. Using Miro boards, they gathered and consolidated these insights into a single, clear problem statement: "The user encounters difficulties in easily and quickly accessing their health plan data, available useful services, and general information about their rights".

In the second part of the workshop, the product vision was developed, in order to decide what would be the initial focus of the solution and the positioning strategy. First, the participants were divided into two groups. Each group created a Miro board describing their shared product vision, which contained information regarding which types of users would be using the app, their problems and the description of the app. Later, both product visions were consolidated into one clear product vision.

Additionally, an activity was held to ease the development of a clear definition of the product. In this step, the participants defined the product by what it is and it isn't, and what it does and it doesn't. Also, this activity promotes the creation of a more precise and aligned vision for the strategic decisions regarding the product, including what the product does, what it doesn't do yet and what it will never do.

On the second day of the workshop, the goal was to establish proto-personas that would later be used to identify features and user journeys. Personas are used to represent a user of the system, its behavior, goals and motives (Blomkvist, 2002).

In this regard, the participants created two different personas, one representing a user who already has a healthcare plan and the other representing a user who is interested in acquiring one. Both personas had a profile with personal information, a description of their behavior and habits, problems and frustrations, and needs and goals.

With the personas in mind, a brainstorming section was conducted to identify the essential features of the app. In addition, the participants built user journeys based on the personas they had previously created.

On the third day, an important discussion was held regarding the prioritization of personas created on the previous day. The participants decided to focus on one persona, the one who represents the user who already has a healthcare plan. Based on this persona, the user journey was consolidated and associated with the features previously gathered.

Throughout the three days of the workshop, we gathered the essential information to develop an MVP Canvas, including an MVP proposal, personas, user's journey and features. Also, through a form shared asynchronously with the participants, we collected the expected results and metrics to validate the business hypothesis.

The expected outcomes for the MVP canvas include: aiding in the procurement planning to develop the app for this public service in a minimal amount of time. Also, improve the current app, as there is a larger scope to be dealt with. Finally, the app should be user-friendly, easy to use, and different from what users have available today. It should also have to evolve to be considered as a reference in the healthcare plan field.

Moreover, the metrics gathered to complete the MVP canvas include increasing app downloads, user numbers, and access compared to the current app history, They also include boosting consumer support channel access relative to other channels, expanding available services, and increasing this service's consultations and searches on the Rol database. Additionally, there is improving user satisfaction, enhancing existing services through digitization, improvement of the satisfaction survey results for the app support channels, and enhancing the app image in society.

6.2. Cycle 2 - Prototyping Workshop

The second cycle lasted for 5 days, using the Design Sprint strategy. The goal was to create a storyboard with wireframes, develop high-fidelity prototypes, and test them with users.

On the first day, the agenda focused on developing two storyboard proposals for the app. The session began with an overview of the MVP proposal and a discussion of the metrics gathered in the first cycle. Participants took notes on their observations and highlighted key points they considered important.

Next, participants were divided into two groups to conduct the Crazy 8s activity, aimed at generating innovative ideas. Using a piece of paper folded three times, each participant reviewed their notes, selected one or more ideas to explore, and created quick one-minute sketches. They experimented with different shapes, structures, content, and other elements, either iterating on a single idea eight times, sketching two different ideas four times each, or varying their approach as needed.

Furthermore, participants developed a storyboard illustrating the user journey, drawing inspiration from the ideas generated in the Crazy 8s activity. The storyboard highlighted key moments where users might face difficulties, ensuring those areas were addressed with greater precision. By the end of the day, each group had drafted a low-fidelity prototype, putting the selected ideas into practice.

On the second day, each group presented the storyboard created on the previous day. The best ideas were then consolidated into a single storyboard. Following this, the groups began developing the high-fidelity prototype, which the designers refined between workshop sessions.

On the third day, the designers presented the high-fidelity prototype, which was validated by the DS participants with minor adjustments.

On the fourth day, user testing was conducted to validate the prototype. The evaluation involved observing different user profiles, including four public agents from the office and four citizens interacting with the prototype. The interviews took place in the government agency responsible for the service. To begin, users were asked introductory questions to better understand their background, such as: 'What brought you here today?', 'Have you tried other means of communication?', and 'Is this your first time seeking this service?'.

Users were then introduced to the prototype and encouraged to verbalize their thoughts following the *think-aloud technique* (Knapp et al., 2016). Observations focused on how they navigated the home screen and their initial impressions. Next, the interviewer asked users to perform specific tasks with the prototype, simulating real interactions with the service.

While users tested the prototype, the DS team observed the sessions remotely via a conferencing tool, taking notes on user perceptions for each feature of the solution using a Miro board. To organize and visualize the collected feedback, a structured board was created with sections corresponding to different areas of the app interface, such as the home screen and healthcare plan information.

Feedback from various users was recorded systematically: positive comments were noted on green post-its, negative feedback on red post-its, and neutral observations on yellow post-its. This structured approach enabled a thorough analysis of user experiences and areas for improvement.

On the fifth day, the DS team reconvened to discuss the user testing results and finalize adjustments to the prototype.

By applying a set of techniques from the Design Sprint approach, we successfully achieved the goal of this cycle: developing a high-fidelity prototype for this government service that is user-friendly, simple, and easy to use.

Overall, participants considered the app prototype a significant advancement for the public service provided by the agency. It streamlines and accelerates service delivery, eliminating the need for users to visit the agency in person. Several users highlighted the time they previously spent traveling to the agency for tasks that could now be completed online through the application.

Additionally, the application would improve communication between citizens and agents. One agent noted that contacting citizens is often challenging, as many do not respond to emails. Addressing complaints via phone or email can also be time-consuming, making effective communication difficult. Furthermore, obtaining necessary documents from users is often problematic, as they frequently delay or fail to send the required materials. The agent believes the app will streamline communication by making it more direct and centralized, helping users better understand requests and respond promptly.

During the user testing observation, one participant praised the team's approach, particularly highlighting their demonstration of empathy. She emphasized that listening carefully to users' needs is crucial. While recognizing that the app is not a complete solution, she noted that it can significantly enhance human interaction. Additionally, she pointed out that optimizing the scheduling system is an area that requires improvement, as users still want to maintain dialogue with real people.

7. Reflections and Lessons Learned

7.1. MVP and Roadmap

The time constraints for involving civil servants in LI and DS workshops led us to streamline these approaches by removing some activities. Specifically for the LI, the removal of the Tech, UX & Business Review, prevented us from and the Sequencer activities required prioritizing personas, journeys, and features throughout the process. Originally, the removed activities are intended to help prioritize the features to be implemented in the MVP, while the other (non-prioritized) features are organized in a Roadmap.

We observed that some participants tend to get anxious about the scope of the MVP when they have to leave behind part of the ideas that are discussed during the workshop. We believe that the lack of a roadmap that includes the non-prioritized feature contributed to this concern. Treating the non-prioritized ideas more formally may help address this issue. An intermediary solution between the informal prioritization and the removed activities might provide a balanced solution.

7.2. Prototypes Quality Level

The public agency required the delivery of a high-fidelity prototype to pitch the project internally within the organization. As a result, we decided to involve designers and work with high-fidelity prototypes starting from the third day of the Design Sprint. This decision required more effort than initially planned, causing the creation and adjustment of prototypes to take more time than anticipated.

While the DS approach recommends that prototypes should be realistic, it emphasizes the need to find a "Goldilocks" level of quality (Knapp et al., 2016). The prototype's quality cannot be too low, as users might not perceive it as a real product, but it also cannot be too high, making it impossible to deliver in time for the user testing session the next day.

Achieving the "Goldilocks" quality level for prototypes is challenging. The use of Figma was invaluable in creating a realistic prototype that simulates the design patterns of digital public services used by the Brazilian government. However, adhering closely to these design patterns required the team to put in extra hours to prepare the prototypes for the user testing session.

In hindsight, we might consider omitting the design pattern and working with a simpler prototype until all necessary adjustments are made. The high-fidelity prototype could then be delivered at the end of the process.

7.3. Value of User Testing Session

The final stage of testing the solution with citizens and civil servants working at the service center proved highly effective in identifying opportunities to improve the user experience with the service and enhance the functionalities selected for the MVP.

The User Testing session provided the workshop participants with an opportunity to understand the value perceived by citizens when using the proposed app. During the session, civil servants were able to clearly observe how citizens interact with the digitized service, the language they use (which sometimes contrasts with the internal jargon of the agency), the difficulties in navigating between screens and potential areas for improvement. They also identified which information should be highlighted for a better user experience. Therefore, this practice is recommended to be adopted whenever possible before developing new features for the application.

Additionally, the agency's DS team found that engaging with users extends beyond the scope of the solution prototype. The context surrounding the user testing sessions offers valuable insights and learning opportunities for enhancing public service offerings to citizens.

8. Conclusion

In this experience report, we reflect on how collaborative design can enhance the user experience of digital public services. A mobile application solution was designed through two cycles of workshops, adapting both Lean Inception and Design Sprint approaches.

While the Lean Innovation and Design Sprint approaches have proven successful in industry, applying them to improve digital public services presents unique challenges. Both methods require a full week of dedicated participation, but securing such a commitment from civil servants is difficult, especially from the most knowledgeable individuals. Adaptations were made to address the challenges encountered when applying these methods in the public services context. We focused on essential activities and used online forms to gather additional input. Another challenge - managing a large, diverse group of stakeholders from different areas - was mitigated by splitting participants into smaller groups and consolidating their results.

This approach enabled effective collaboration, even with civil servants who had limited availability. The project outcomes were praised by the government agency as an exemplary process for innovation in digital public service design. Involving citizens in user testing sessions was particularly noted as a valuable opportunity to improve public services.

Reflections on the workshops execution provided insights into practices that can be refined for the future collaborative design projects in the government.

Acknowledgment

- **Funding or Grant**: This research is part of a cooperation agreement between the Information Technology Research and Application Center (ITRAC) at the University of Brasilia (UnB) and the Ministry of Management and Innovation in Public Services (MGI), Secretariat for Digital Government (SGD), Directorate for Digital Transformation Dissemination.
- **Contributor Statement**: Elaine Venson: Conceptualization, Data Curation, Investigation, Methodology, Writing - Original Draft. Julia de Souza: Data Curation, Methodology, Writing - Original Draft. Sara

Campos: Data Curation, Methodology, Writing - Original Draft. Rejane Figueiredo: Funding acquisition, Supervision, Resources. George Marsicano: Data Curation, Writing - Review & Editing. Wander Pereira Silva: Conceptualization, Data Curation.

- **Use of AI**: During the preparation of this work, the author(s) used OpenAI's ChatGPT for language refinement and translation support. After using this tool/service, the author(s) reviewed, edited, made the content their own and validated the outcome as needed, and take(s) full responsibility for the content of the publication.
- **Conflict Of Interest (COI)**: There is no conflict of interest.

References

Blomkvist, S. (2002). Persona–an overview. *Retrieved November*, *22*(2004), 15.

Caroli, P. (2018, October). *Lean inception: Como alinhar pessoas e construir o produto certo*. Editora Caroli.

Ferreira, B., Kalinowski, M., Gomes, M. V. D. C., Marques, M. C., Lopes, H., & D.J. Barbosa, S. (2021). Investigating Problem Definition and End-User Involvement in Agile Projects that Use Lean Inceptions. *XX Brazilian Symposium on Software Quality*, 1–10. DOI: https://doi.org/10.1145/3493244.3493268.

Figueiredo, R., Pedrosa, G. V., Gardenghi, J. L. C., Venson, E., Judice, M. O., Judice, A. C. B., Costa, F. F., Silva, W. M. P. d., & Marsicano, G. (2024). Co-design and Co-creation in Digital Public Services: A Service Design Approach [ISSN: 2763-8723]. *Workshop de Computação Aplicada em Governo Eletrônico (WCGE)*, 62–73. DOI: https://doi.org/10.5753/wcge.2024.2440.

Knapp, J., Zeratsky, J., & Kowitz, B. (2016). *Sprint: How to solve big problems and test new ideas in just five days*. Simon; Schuster.

Lárusdóttir, M. K., Cajander, Å., & Roto, V. (2023). *User centred design approaches and software development processes*. Reykjavik University, Uppsala University, Aalto University.

Lobão, L., Rabaioli, B. T. V., Gauthier, E., Araújo, L. L. d., & Meireles, M. A. C. (2023). The use of design thinking in creating projects and improving customer value perception: An experience report on software projects at a research and development institute in amazonas. *Proceedings of the Instituto de Desenvolvimento Tecnológico-INDT*.

Luna, D. E., Picazo-Vela, S., Buyannemekh, B., & Luna-Reyes, L. F. (2024). Creating public value through digital service delivery from a citizen's perspective. *Government Information Quarterly*, *41*(2), 101928. DOI: https://doi.org/10.1016/j.giq.2024.101928.

Mergel, I., Edelmann, N., & Haug, N. (2019a). Defining digital transformation: Results from expert interviews. *Government Information Quarterly*, *36*(4), 101385. DOI: https://doi.org/https://doi.org/10.1016/j.giq.2019.06.002.

Mergel, I., Edelmann, N., & Haug, N. (2019b). Defining digital transformation: Results from expert interviews. *Government Information Quarterly*, *36*(4), 101385. DOI: https://doi.org/10.1016/j.giq.2019.06.002.

Osborne, S. P., Powell, M., Cui, T., & Strokosch, K. (2022). Value Creation in the Public Service Ecosystem: An Integrative Framework. *Public Administration Review*, *82*(4), 634–645. DOI: https://doi.org/10.1111/puar.13474.

Osborne, S. P., Radnor, Z., & Strokosch, K. (2016). Co-Production and the Co-Creation of Value in Public Services: A suitable case for treatment? *Public Management Review*, *18*(5), 639–653. DOI: https://doi.org/10.1080/14719037.2015.1111927

Um dos mais citados do OSBORNE - 2016.

Pelinson, T., & Campese, C. (2023). Sprint design – aplicação em portal web de serviços públicos de São Paulo - SP, Brasil. *Brazilian Journal of Science*, *2*(12), 94–105. DOI: https://doi.org/10.14295/bjs.v2i12.387.

Scupola, A., & Mergel, I. (2022). Co-production in digital transformation of public administration and public value creation: The case of Denmark. *Government Information Quarterly*, *39*(1), 101650. DOI: https://doi.org/10.1016/j.giq.2021.101650.

Strokosch, K., & Osborne, S. P. (2020). Co-experience, co-production and co-governance: An ecosystem approach to the analysis of value creation. *Policy & Politics*, *48*(3), 425–442. DOI: https://doi.org/10.1332/030557320X15857337955214.

Szabó, B., & Hercegfi, K. (2023). User centered approaches in software development processes: Qualitative research into the practice of Hungarian companies. *Journal of Software: Evolution and Process*, *35*(2), e2501. DOI: https://doi.org/10.1002/smr.2501.

Zimmermann, V., Heimicke, J., Schnurr, T., Bursac, N., & Albers, A. (2021). Minimum viable products in mechatronic system engineering: Approach for early and continuous validation. *R&D Management Conference 2021-Innovation in an Era of Disruption*.