


# Toward a Human-Centered and Ecosystemic Evaluation Framework for Public Sector Digital Planning

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## Abstract

Digital transformation in the public sector requires not only technological advances but also approaches that prioritize citizen experience and the generation of public value across multiple levels. This article proposes an evaluation model for digital planning in government agencies, grounded in a human-centered and ecosystemic perspective. Based on the integration of Human-Computer Interaction (HCI) principles, public value theory, and participatory design approaches, we developed a maturity index composed of six dimensions: usability, accessibility, user experience (UX), co-creation, transparency, and adherence to public guidelines. Each dimension is operationalized through a checklist of indicators applicable to Information Technology Master Plans (PDTIs). The model was applied to PDTIs from Brazilian federal ministries, enabling the identification of gaps and best practices related to user centrality and digital public value creation. The results highlight the importance of incorporating HCI approaches from the early stages of IT planning as a strategy to strengthen digital citizenship, inclusion, and institutional legitimacy. This study contributes methodologically to the evaluation of digital public policies and opens avenues for future research focused on measuring user experience in the governmental context.

**Keywords:** Human-Centered Design, Digital Government, Public Value, Human-Computer Interaction (HCI), IT Planning Evaluation

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## 1. Introduction

Digital transformation in the public sector has been promoted as a strategy to modernize public administration, expand access to essential services, and increase the efficiency and transparency of government agencies (Dunleavy et al., 2006; Misuraca et al., 2020). In this context, Information and Communication Technology Master Plans (PDTIs) are essential tools for the strategic alignment of ICT actions in public institutions. However, these plans often adopt an infrastructure- and governance-centered approach, sidelining aspects related to citizens' experience with digital services (Cordella & Paletti, 2019).

Recent literature on digital government has emphasized the importance of evaluating not only the administrative outcomes of such initiatives, but also the users' perceived effects—especially those related to social inclusion, citizen participation, institutional trust, and the legitimacy of government actions (Bryson et al., 2014; Alford & O'Flynn, 2009; Osborne et al., 2022). In this perspective, the concept of public value, as formulated by Moore (1995), has become a relevant theoretical framework for understanding the social, political, and symbolic benefits generated by digital public policies. Based on this concept, several evaluative models have been developed to measure the level of digital maturity of public organizations, such as the PVE-GAM (Public Value-based E-Government Adoption Model) (Karusenasena & Deng, 2012) and the model by Joshi et al. (2018).

Despite these advances, these models show limitations when it comes to considering the quality of interaction between citizens and public digital systems—an essential factor for the success of user-centered

services. This is where the foundations of Human-Computer Interaction (HCI) provide valuable contributions by offering principles and methods focused on accessibility, usability, interface clarity, and user participation in the design of digital solutions (Nielsen, 1995; Shneiderman et al., 2016). The importance of this approach is reiterated in the “Grand Challenges of HCI Research in Brazil for the period 2025–2035”, which point to the creation of public value in digital services as a strategic priority for the field, especially in contexts of governmental transformation and democratic innovation.

However, HCI foundations are still rarely incorporated into institutional planning processes within public administration, often resulting in digital solutions that, although technically robust, fail to meet citizens' real needs and expectations. This methodological and practical gap reinforces the need for evaluative models that systematically integrate the dimensions of human-computer interaction into the assessment of digital maturity in public agencies.

Given this scenario, this article seeks to answer the following research question: *How can digital planning in the public sector be evaluated from a human-centered and ecosystemic perspective, considering the quality of interaction between citizens and digital systems and its contribution to public value creation?*

To address this question, this study proposes an evaluative model structured around six dimensions: usability, accessibility, user experience, co-creation, transparency, and adherence to institutional guidelines. The model is operationalized through a verification instrument based on HCI principles and public value theory, and applied

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to the analysis of PDTIs from Brazilian federal ministries. The proposal aims to offer methodological tools to strengthen citizen centrality in digital planning and contribute to a more comprehensive and human-centered evaluation of digital transformation public policies. The structure of this article is as follows: Section 2 presents the theoretical foundation supporting the proposed model, linking concepts from digital planning, HCI, public value, and existing evaluation models. Section 3 details the evaluation model, including its dimensions, criteria, and the verification instrument. Section 4 describes the empirical application of the model to three Brazilian federal ministries, highlighting the results and offering a comparative analysis. Section 5 provides policy recommendations for a human-centered and ecosystemic planning approach. Section 6 discusses threats to the validity of the study. Finally, Section 7 outlines the main contributions, limitations, and implications of the research, suggesting directions for future work and improvements in digital public sector planning.

## 2. Literature Review

In the field of Human-Computer Interaction (HCI), the Grand Research Challenges for the 2025–2035 period in Brazil (Pereira et al., 2024) emphasize the urgency of rethinking the role of digital technology in social contexts. These challenges advocate, among other aspects, the need to develop people-centered public policies, more equitable and accessible systems, participatory methodologies, and context-sensitive evaluations. There is, therefore, a significant convergence between the principles of HCI and the ecosystemic approach to public services, especially regarding digital inclusion, user experience, and institutional culture. This theoretical framework seeks to integrate these two agendas.

### 2.1 Digital Planning in the Public Sector

Digital planning is a critical component of contemporary governmental strategy, as it enables the alignment of technological resources with institutional and social needs. In Brazil, digital planning is implemented through the Information Technology Master Plans (PDTIs), normative instruments mandated by oversight bodies such as the Federal Court of Accounts (TCU), designed to ensure governance, efficiency, and transparency in public administration's IT activities.

Although PDTIs have made progress in structuring internal processes, they still exhibit limitations in incorporating approaches focused on citizen experience and public value creation. Authors such as Dunleavy et al. (2006) and Cordella and Paletti (2019) highlight that a predominant emphasis on infrastructure and resource management may obscure critical aspects of effective digital public services, such as accessibility, usability, and citizen participation in solution design.

### 2.2 Human-Computer Interaction and User Experience

Human-Computer Interaction (HCI) is a multidisciplinary field concerned with the design, implementation, and evaluation of interactive systems centered on the needs, capabilities, and limitations of human users. In the context of digital public services, HCI offers significant contributions toward developing solutions that are more accessible, inclusive, efficient, and pleasant to use (Shneiderman et al., 2016).

Authors like Nielsen (1995) have proposed widely adopted usability heuristics, while models such as e-MAG (Brazilian Government's Accessibility Model) and international guidelines like WCAG guide the construction of accessible interfaces for all users. More recently, the Grand Research Challenges in HCI in Brazil (2025–2035) (Pereira et al., 2024) highlight the creation of public value through citizen-system interaction as one of the field's main strategic goals. This direction reinforces the need to integrate HCI principles into the early strategic planning of digital services, not just in later development phases.

### 2.3 Public Value in Digital Ecosystems

The notion of public value refers to the State's capacity to generate socially legitimized benefits that go beyond operational efficiency. According to Moore (1995), creating public value involves articulating the goals of public organizations, the expectations of citizens, and the operational feasibility of the services delivered. Bryson et al. (2014) expand this view by incorporating the concept of network governance, emphasizing that value co-creation occurs in ecosystems composed of multiple stakeholders.

Osborne et al. (2022) argue that value creation must be analyzed across multiple levels—macro (systems), meso (organizations), micro (interactions), and submicro (devices and interfaces)—which justifies the integration of HCI perspectives into digital public service analysis. Evaluating how technologies foster (or hinder) participation, transparency, and institutional trust is essential to assessing digital planning from an ecosystemic standpoint.

### 2.4 Evaluation Models in Digital Government

Over the past decades, several models have been developed to assess the digital maturity of public organizations, primarily focusing on technological infrastructure, IT governance, and system integration. A notable example is the Digital Transformation Scoreboard, developed by the European Commission, which proposes a multidimensional approach including interoperability, innovation, and social impact as key assessment axes (European Commission, 2021). Internationally, initiatives such as the United Nations' E-Government Development Index (EGDI) and the OECD's Digital Government Index (DGI) aim to measure countries' digital performance based on objective data, public policies, and citizen engagement indicators (United Nations, 2022; OECD, 2020).

In academic settings, models like the Public Value-Based E-Government Adoption Model (PVEGAM) emphasize the importance of citizen orientation, institutional trust, and service quality as success factors in e-government adoption (Karunasena & Deng, 2012). Joshi et al. (2018) extend this approach by proposing a multidimensional maturity model encompassing public value, accessibility, reliability, and transparency.

Nevertheless, despite these advancements, most evaluative models still lack specific mechanisms to incorporate criteria related to the quality of citizen-system interaction—central to HCI. Most approaches remain focused on organizational efficiency or digitization levels, neglecting crucial aspects such as usability, accessibility, co-creation, and users' perceived value.

Some more recent studies aim to bridge this gap. For instance, Cordella and Tempini (2021) propose an evaluation based on “value logics” in public services, arguing that technology creates real value only when embedded in users’ practices. Gil-García et al. (2015) stress the importance of contextual and citizen-experience-sensitive evaluations in smart urban environments. In Brazil, studies such as Freitas et al. (2024) reveal that IT Master Plans still reflect a predominantly technical and normative view, paying little attention to citizen centrality.

Still, these approaches lack explicit mechanisms for evaluating the quality of interactions between citizens and digital services. The absence of criteria related to usability, accessibility, and active user participation reinforces the need for models that explicitly integrate HCI contributions into digital planning processes in the public sector.

Similar planning-stage challenges have also been documented in other emerging economies. The OECD Digital Government Review of Latin America and the Caribbean (2023) highlights that governments across Latin America often prioritize infrastructure and interoperability over usability, accessibility, and citizen participation. Reports from the United Nations E-Government Survey also reinforce this imbalance between technical modernization and human-centered service delivery. These findings suggest that the limitations observed in the Brazilian case are not isolated but reflect broader structural barriers across developing countries. Therefore, our proposed evaluation model can offer valuable insights both nationally and internationally.

### 3. Proposed Evaluation Model

The model proposed in this study differs from traditional digital planning assessment models by explicitly adopting a human-centered and ecosystemic perspective, focusing on the quality of interaction between citizens and public digital systems, as well as the generation of public value at multiple levels.

Whereas classic digital maturity models emphasize technical structures, IT governance, or levels of informatization, the present approach incorporates foundational concepts from Human-Computer Interaction (HCI), user-centered design principles, and the directives established by Brazil’s Grand Research Challenges in HCI for 2025–2035 (Pereira et al., 2024), which reinforce the centrality of the citizen’s experience in the State’s digital transformation.

The methodological innovation lies in the construction of a structured checklist that operationalizes qualitative dimensions such as usability, accessibility, co-creation, user experience, and adherence to public standards. This instrument enables the evaluation of how PDTIs incorporate (or neglect) human-centered practices, emphasizing the creation of public value through more effective, inclusive, and participatory digital interactions.

#### 3.1 Assessed Dimensions

The model comprises six core dimensions, developed based on the literature on HCI, public value, and digital government. These are:

1. **Usability** – Assesses whether the proposed services consider ease of use, clarity, and interface consistency.
2. **Accessibility** – Evaluates the commitment to digital inclusion, considering guidelines such as e-MAG and WCAG.
3. **User Experience (UX)** – Analyzes the citizen’s journey and the use of satisfaction metrics such as SUS and NPS.
4. **Co-creation** – Examines user involvement in the design, validation, and improvement of digital services.
5. **Transparency and Control** – Investigates whether the planned services foster clarity, feedback, and user autonomy.
6. **Adherence to Public Guidelines** – Verifies alignment with national policies such as the Digital Government Strategy (EGD), e-MAG, and Eping.

These six dimensions were designed to reflect different levels of public value creation—macro, meso, micro, and submicro—as proposed by Osborne et al. (2022), and are also aligned with Brazil’s Grand Research Challenges in HCI for the 2025–2035 period (Pereira et al., 2024). Adding more dimensions could compromise the model’s applicability in documentary assessments, while excluding any of them would mean overlooking fundamental aspects of user centrality. Thus, the proposed set aims to capture both the quality of interaction and the institutional alignment with public value-oriented digital policies.

The definition of these six dimensions strikes a balance between conceptual breadth and practical feasibility. Dimensions like usability and accessibility are widely acknowledged as pillars of quality in interactive systems, as discussed by Nielsen (1995) and embedded in guidelines such as WCAG and e-MAG. The user experience dimension complements this perspective by incorporating perceptual and emotional aspects of interaction—crucial in evaluating the maturity of digital services (Shneiderman et al., 2016).

The co-creation dimension is grounded in literature on public value ecosystems, in which value is distributed among multiple actors, including citizens (Bryson et al., 2014; Osborne et al., 2022). Meanwhile, the transparency and control dimension addresses the need to ensure algorithmic legitimacy, informational autonomy, and clarity in technology-mediated processes (Cordella & Paletti, 2019). Lastly, adherence to public directives ensures that digital services are aligned with normative strategies such as the Digital Government Strategy (EGD), e-MAG, and ePING.

#### 3.2 Evaluation Instrument (Checklist)

Each dimension is operationalized through three specific indicators, totaling **18 evaluative items**. These items make up a structured checklist that guides the qualitative analysis of PDTIs based on textual evidence. Each item is scored according to the following scale:

- **0** – Absent or not mentioned
- **1** – Mentioned in a partial or generic way
- **2** – Clear, explicit, and structured evidence

The full checklist is presented in **Table 1**, containing the 18 indicators and the expected evidence for analyzing the PDTIs. This instrument

can be reused by institutional evaluators or researchers interested in monitoring the human-centered maturity of digital planning in public agencies.

Table 1: Checklist of indicators and expected evidence for the proposed evaluation model.

Dimension	Indicator	Expected Evidence in the Digital Plan (PDTI)
Usability	1.1. Conducting usability tests	Mention of user testing, prototypes, or HCI labs
	1.2. Application of Nielsen heuristics or similar	Reference to design standards, heuristic criteria, or interface evaluation
	1.3. Responsive and consistent design	Adaptability to devices, visual and functional consistency
Accessibility	2.1. Compliance with e-MAG or WCAG	Direct reference to e-MAG, WCAG 2.1, or accessibility best practices
	2.2. Proper contrast and screen reader compatibility	Technical accessibility requirements described
	2.3. Testing with users with disabilities	Report of tests or involvement of people with disabilities
User Experience (UX)	3.1. Use of UX metrics like NPS, SUS	Use of user satisfaction measurement tools
	3.2. User journey maps or personas	Mapping user experience throughout the digital service
	3.3. Immediate feedback, clean and fluid UI	User-centered design focusing on clarity and speed
Co-Creation	4.1. Workshops with users for solution development	Reports of workshops, interviews, exploratory tests
	4.2. Prototype testing in iterative cycles	Mention of prototyping, agile testing, or Design Thinking
	4.3. Active incorporation of received feedback	Adjustments based on real user feedback
Transparency and Control	5.1. Clarity on terms, policies, and automated decisions	Clear privacy policy, explanation of algorithms
	5.2. Real-time feedback on service status	Proposals for dashboards, notifications, or online tracking
	5.3. User control options over their information	Features to review, delete, or edit personal data
Adherence to Public Guidelines	6.1. Adherence to the Digital Government Strategy (EGD)	Citation or alignment with current EGD
	6.2. Alignment with e-MAG, Eping, or institutional policies	Explicit compliance with public guidelines
	6.3. Interoperability and open data planning	System integration, public APIs, open data initiatives

### 3.3 Maturity Index Calculation

The score for each dimension is the sum of its three indicators, and the total score is the sum of all 18 indicators. Therefore, the maximum possible score is **36 points**.

We suggest classifying the maturity level into three tiers, as shown in **Table 2**:

- 0–11 – Initial
- 12–24 – Intermediate
- 25–36 – Advanced

Table 2. Maturity level classification based on the proposed index.

Score Range	Maturity Level
0 to 11	Initial
12 to 24	Intermediate
25 to 36	Advanced

## 4. Empirical Application

To validate and demonstrate the model, we analyzed three Information Technology Master Plans (PDTIs) from Brazilian ministries:

- Ministry of Health – PDTIC 2022–2024
- Ministry of Education – PDTIC 2021–2023
- Ministry of Social Development and Assistance – PDTI 2023–2027

These cases were selected based on three criteria: (i) public accessibility and availability of complete and updated documents on institutional websites; (ii) thematic diversity in public policies, covering sectors such as health, education, and social assistance—all highly sensitive to citizen experience; and (iii) plan recency (from 2021 onward), ensuring alignment with current guidelines such as the Digital Government Strategy and the General Data Protection Law (LGPD).

The analysis consisted of a systematic reading of the documents, extracting evidence related to the checklist indicators. The scores were justified with textual excerpts from the PDTIs and recorded transparently.

### 4.1 Results

#### 4.1.1 Ministry of Health

The Ministry of Health’s IT Master Plan (2022–2024) shows **low maturity** in aspects related to user experience, usability, and accessibility. Although there are occasional mentions of UX and digital transformation, no concrete evidence was found of actions such as usability testing, the use of heuristics, validation with personas, or the inclusion of people with disabilities in design and development processes.

Furthermore, the plan lacks satisfaction metrics and makes no reference to prototyping or real-time feedback mechanisms. On the other hand, the document stands out positively in two areas: explicit adherence to the Digital Government Strategy (EGD) and strong planning for interoperability and open data, particularly in the context of the National Health Data Network (RNDS).

Table 3 presents the checklist scores and the evidence found, revealing a strong focus on infrastructure and data, but an absence of human-centered practices and digital accessibility.

**Table 3.** Checklist for the Ministry of Health’s Digital Plan (PDTI).

Indicator	Score	Evidence Found
1.1	0	No mention of empirical testing with users was found.
1.2	1	There is a reference to UX and design licenses for the frontend.
1.3	1	Mentions frontend and graphic design teams, but with no clear technical commitment.
2.1	0	Total absence of references to digital accessibility standards.
2.2	0	No mention of visual or auditory accessibility criteria.
2.3	0	No evidence of inclusion of persons with disabilities in validation processes.
3.1	0	No use of standardized surveys like SUS or NPS.
3.2	0	No profiles, user flows, or user journeys were found.
3.3	1	Mentions automated notifications to citizens.
4.1	1	Refers to “participatory evaluation” of the Digital Health Strategy.
4.2	0	No evidence of iterative development or use of MVPs.
4.3	1	Intends to improve digital channels and citizen service.
5.1	0	No explanation of how automation or AI services work.
5.2	1	Forecast of notification delivery via the Conecte SUS platform.
5.3	2	Multiple mentions of LGPD compliance in e-SUS and SISAB systems.
6.1	2	Several mentions of the EGD and Decree No. 10.332/2020 as strategic foundations.
6.2	0	No mention of the e-Government accessibility model.
6.3	2	Strong presence: RNDS, integration with Telessaúde, open data in SISAB.
<b>Total</b>	<b>12</b>	

**4.1.2 Ministry of Education**

The Ministry of Education’s IT Master Plan (2021–2023) demonstrates **modest progress** in user-centered design, particularly through the adoption of concepts such as **Design Thinking**, multidisciplinary squads, and agile culture. These elements indicate an intention to promote iterative development, although no clear evidence was found of heuristic application, usability testing, or systematic user feedback collection.

References to the student’s journey and user experience suggest some awareness of the citizen perspective, but lack methodological details such as journey mapping or persona development. There are also notable gaps in accessibility, citizen data control, and real-time visual feedback.

Table 4 shows the scores and supporting evidence. Although the plan shows modern concepts and good intentions, it lacks concrete execution and a clear commitment to inclusion and usability.

**Table 4.** Checklist for the Ministry of Education’s Digital Plan (PDTI).

Indicator	Score	Evidence Found
1.1	0	No mention of user testing or formal usability evaluations.
1.2	1	Refers to Design Thinking and agile culture, but without detailing specific heuristics.
1.3	1	Mentions consistency and improvement of user experience, but does not detail responsive design principles.
2.1	0	No references to e-MAG, WCAG, or digital accessibility guidelines were found.
2.2	0	No evidence of implementation of visual or auditory accessibility.
2.3	0	No mention of inclusion or testing with people with disabilities.
3.1	0	No mention of evaluation instruments like NPS, SUS, or UX indicators.
3.2	1	Mentions the student journey and continuous experience, but without explicit use of maps or personas.
3.3	0	No explicit mentions of visual or real-time feedback mechanisms.
4.1	1	Refers to co-creation and adaptive involvement, but lacks detail on participatory processes.
4.2	1	Agile culture and squads suggest iterative cycles, but no details on prototype testing.
4.3	1	Mentions value delivery focused on users, but no clear suggestion collection process.
5.1	0	No discussion on automated decisions or their transparency to citizens.
5.2	0	No mention of real-time response mechanisms or informative engagement.
5.3	1	Refers to digital identity and information security, but lacks detail on citizen-level control.
6.1	2	Aligned with the Digital Government Strategy, explicitly mentions SISP and SGD.
6.2	0	No reference to compliance with the Brazilian accessibility model.
6.3	2	Multiple mentions of system integration, XaaS, digital identity, and strategic data use.
<b>Total</b>	<b>11</b>	

### 4.1.3 Ministry of Social Development and Assistance

The MDS's IT Master Plan (2023–2027) comes closest to a citizen-oriented strategy, although it shares similar gaps with the other ministries. The plan emphasizes MVPs, hyperautomation, federated integration, and prioritization of digital services through the Gov.br platform, demonstrating concern for interoperability and scalability.

It also stands out for explicitly mentioning compliance with the General Data Protection Law (LGPD), reinforcing data privacy and

control. Additionally, it refers to the creation of unified citizen service channels, indirectly signaling concern for interaction flow. However, like the others, the plan does not address digital accessibility, testing with users with disabilities, or formal satisfaction instruments such as SUS or NPS.

Table 5 summarizes the evidence found. Overall, the plan advances in digital service architecture and data governance but still lacks inclusive and empathetic HCI practices.

**Table 5.** Checklist for the MDS Digital Plan (PDTI).

Indicator	Score	Evidence Found
1.1	0	No mention of user testing in real or simulated environments.
1.2	1	Discusses principles of digital transformation and citizen experience, but does not explicitly mention heuristics.
1.3	1	Intends to improve digital experience and unify channels, but lacks technical detail on responsiveness.
2.1	0	No mention of accessibility guidelines such as e-MAG or WCAG.
2.2	0	No mention of technical criteria for visual accessibility or assistive technologies.
2.3	0	No evidence of testing with people with disabilities during system development.
3.1	0	No mention of formal satisfaction tools such as SUS or NPS.
3.2	0	No modeling practices identified such as user journey maps or personas.
3.3	0	No mentions of real-time interactions, visual feedback, or microinteractions.
4.1	1	References listening and dialogue with society, but lacks methodological detail.
4.2	1	Mentions development of MVPs and pilots within hyperautomation initiatives.
4.3	1	Mentions integration with social demands and focus on experience, but lacks clear feedback mechanisms.
5.1	0	No accessible explanations about automated decisions or algorithms.
5.2	1	Mentions creation of unified channels and improvement of citizen interaction, but lacks usage examples.
5.3	2	Reinforces LGPD compliance and highlights actions on data security and privacy.
6.1	2	Explicitly aligned with EGD, mentions Decree No. 10.332/2020 and strategic goals of EGD.
6.2	0	No direct mention of the e-MAG model.
6.3	2	Strong emphasis on data integration goals, federated bus, interoperability, and AI use.
<b>Total</b>	<b>12</b>	

### 4.1.4 Comparative Analysis

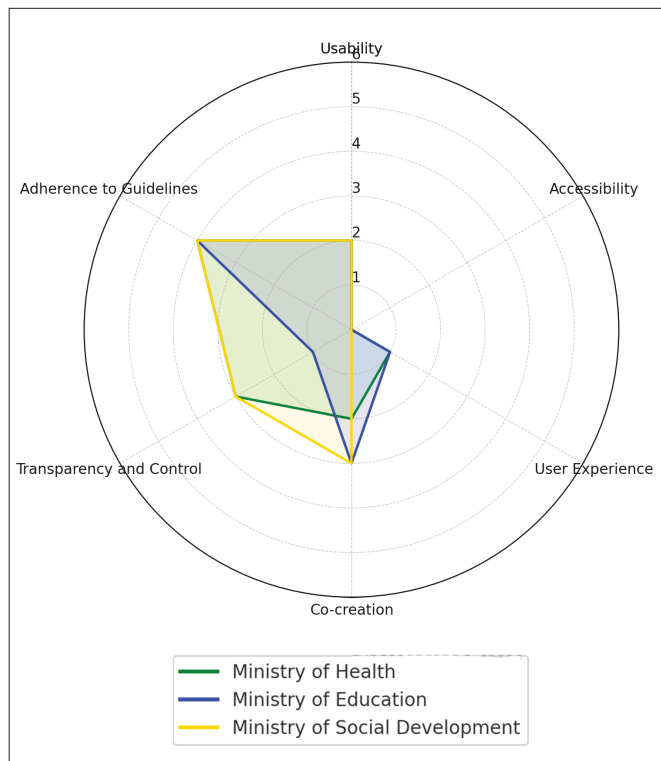
Figure 1 presents a comparative view of the three ministries' PDTIs across the six dimensions of the proposed evaluation model. Despite minor differences, all ministries share significant weaknesses in accessibility and citizen participation. This panorama reinforces the need for institutional strengthening in HCI practices, emphasizing empathetic design, accessibility, and iterative evidence-based development.

Based on the scores and the scale defined in Table \ref{tab:faixa}, none of the three ministries reached the "Advanced" level. The Health and Education ministries fall into the intermediate range, though

closer to the lower threshold. This reflects the presence of some modern concepts (e.g., agile culture, design thinking), but a lack of systematization and established participatory practices.

This classification reveals that, even across ministries with distinct missions and varying levels of technical maturity, there is a shared fragility in treating user experience as a quality criterion. The absence of any ministry in the "Advanced" tier underscores that a human-centered approach has not yet been fully integrated into federal public sector digital planning. This validates the usefulness of the proposed model as a diagnostic tool and as a means of driving institutional improvement.

**Figure 1.** Comparison of Ministries by Evaluation Dimensions



**Discussion**

The Ministry of Social Development stands out for its more structured approach to data governance and interoperability, while the Ministry of Education shows conceptual progress with agile methodologies and design thinking. The Ministry of Health demonstrates technical balance but lacks in areas of inclusion and citizen engagement.

Regarding usability, all three ministries earned similar scores, suggesting the presence of some guidelines or usability-oriented initiatives. However, no evidence was found of systematic user testing, heuristic application, or robust interface performance indicators.

Digital accessibility remains a critical gap across all three plans, each scoring zero. None of the documents mentioned compliance with e-MAG or WCAG guidelines, nor showed concern for assistive technologies, color contrast, or screen readers. This evidences a lack of commitment to digital inclusion for people with disabilities.

User experience was also underexplored. Only the Ministry of Education achieved a marginal score (1), with indirect references to the student’s journey. The other two ministries failed to demonstrate structured user experience modeling, such as personas, journey maps, or contextual feedback.

In co-creation, the Ministries of Education and Social Development both scored 3, referencing multidisciplinary squads, active listening, and MVP development. The Ministry of Health scored 2, reflecting a

more reactive approach. None of the ministries, however, described formal workshops or structured co-creation processes with citizens. Both the Ministry of Health and the Ministry of Social Development scored 3 in transparency and control, due to their commitment to LGPD, data privacy, and citizen service channels. The Ministry of Education, with a score of 1, lacked clear elements of data use transparency and automation oversight.

All three ministries scored well in alignment with public guidelines, reflecting formal adherence to national digital strategies such as the EGD, integration with the Gov.br platform, and alignment with SISP.

**5.1 Theoretical and Practical Implications**

The findings of this study contribute meaningfully to both theoretical debates on digital government and practical planning within public institutions. Theoretically, the model expands the discussion on digital maturity by explicitly integrating Human-Computer Interaction (HCI) principles into public policy evaluation. Rather than treating user experience as peripheral, the model positions it as central to understanding the readiness of public institutions to deliver inclusive, accessible, and effective digital services.

This perspective aligns with a broader shift in the literature from a purely technical focus to a holistic understanding of public value. By connecting HCI, co-creation, and strategic planning guidelines, the model advances the development of more sensitive evaluative instruments for assessing State-citizen digital interactions.

Practically, the model provides a concrete tool for public managers to critically review their PDTIs. By highlighting strengths and weaknesses in dimensions such as usability, accessibility, and user participation, the checklist can guide improvement actions and foster a more participatory, user-centered organizational culture.

Moreover, the results show that significant progress remains necessary. The absence of basic inclusion practices and experience metrics indicates that many public agencies still treat the citizen as a spectator, not an active participant in digital transformation. Thus, the model can also serve as a starting point for internal reflection and institutional capacity-building.

**5.2 Recommendations for Public Policy**

The study’s findings highlight a disconnect between user-centered principles, strongly endorsed in HCI literature, and current digital planning practices in public institutions. Based on the identified weaknesses, the following policy recommendations are offered to strengthen human-centered value creation in public digital strategies:

- 1. Institutionalize active listening and participatory design.** The lack of user workshops, iterative prototyping, and structured feedback calls for embedding co-creation mechanisms in PDTI processes. Public policies should establish normative guidelines requiring public consultations, user testing, and participatory validation reports.

2. **Incorporate usability and user experience metrics.** None of the analyzed plans used consolidated instruments such as SUS or NPS. These tools should be standardized and adopted as minimum criteria in service evaluations to promote a culture of satisfaction monitoring and quality control.
3. **Mandate digital accessibility requirements.** The total absence of references to e-MAG or WCAG suggests the need for mandatory accessibility compliance as a precondition for PDTI approval. A minimum technical checklist, accompanied by practical guidelines and team training, should be included.
4. **Align institutional goals with citizen experience principles.** Public strategies must move beyond infrastructure and interoperability, incorporating symbolic and perceptual dimensions of public value—including citizen engagement targets, algorithmic transparency, and customized service feedback.
5. **Promote the use of the proposed evaluation model.** Oversight bodies such as the TCU and digital governance entities should consider adopting or adapting the model presented here for ex ante evaluation of PDTIs. Its application would enable comparable diagnostics, the identification of best practices, and structural improvements in the digital culture of the public sector.

These recommendations aim not only to fill technical and methodological gaps but also to encourage a paradigm shift in public digital planning—from a focus solely on efficiency to one that is truly human-centered.

### Threats to Validity

As with any empirical study, this work is subject to limitations that may affect the validity of its findings. The following subsections discuss internal, external, and construct validity concerns.

**Internal Validity:** The PDTIs were analyzed using a structured qualitative checklist, applied by evaluators interpreting explicit textual evidence. While objective scoring criteria were used, the inherent subjectivity of content analysis may have influenced results. To mitigate this, textual justifications were documented for each score, promoting transparency and reproducibility.

**External Validity:** The model was applied to only three federal ministries, limiting the generalizability of findings. Although the selected cases represent strategic policy areas (health, education, social assistance), it is not possible to assume the observed patterns apply to other government bodies or levels. Future studies with broader and more diverse samples are needed to test the model's robustness and adaptability.

**Construct Validity:** Another limitation lies in how the evaluated dimensions were operationalized. Although grounded in HCI, digital government, and public value literature, some relevant practices may

not have been captured by the selected indicators. Furthermore, the analysis relied solely on documentary content without empirical validation from actual users. This creates a risk of disconnect between planned and implemented practices.

Future research may involve multiple evaluators, intersubjective validation, and triangulation with quantitative and qualitative user-centered methods.

Additionally, future applications of the model could benefit from the involvement of multiple evaluators to ensure inter-rater reliability and further enhance methodological robustness

### Conclusion

This article proposed an innovative evaluation model for digital planning in the public sector, grounded in Human-Computer Interaction (HCI) principles and an ecosystemic perspective on public value creation. By integrating dimensions such as usability, accessibility, user experience, co-creation, transparency, and alignment with institutional guidelines, the model broadens the traditional scope of Information Technology Master Plans (PDTIs), placing citizen centrality at the core of digital strategy.

The model's empirical application across three federal ministries revealed notable gaps in human-centered practices, particularly regarding digital accessibility and user experience measurement. While the documents show formal alignment with national strategies such as the EGD and LGPD, the findings suggest that the citizen's lived experience is not yet adequately reflected in planning and evaluation processes.

These findings underscore the urgency of embedding participatory methodologies, real user testing, and accessibility guidelines from the earliest stages of public-sector digital planning. The proposed model offers not only a diagnostic tool but also a normative framework to guide more inclusive, legitimate, and public value-oriented digital transformations.

For future research, broader application of the model across more public agencies is recommended, along with its adaptation to sub-national levels of government. Qualitative investigations into users' perceptions of planned digital services could further enrich the insights provided by this study and contribute to truly human-centered digital public policies.

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