FEDERAL UNIVERSITY OF CEARÁ

CONTEXTUS
REVISTA CONTEMPORÂNEA DE ECONOMIA E GESTÃO
Contextus – Contemporary Journal of Economics and Management

ISSN 1678-2089
ISSNe 2178-9258

www.periodicos.ufc.br/contextus

A gated integration model for applied research in GovTech

Um modelo de integração gated para pesquisa aplicada em GovTech

Un modelo de integración gated para la investigación aplicada en GovTech

https://doi.org/10.36517/contextus.2026.97092

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Article Information
Uploaded on 29/05/2026
Final version on 30/07/2026
Accepted on 01/08/2026
Published online on 25/11/2026

Section: Technological Articles
Interinstitutional Scientific Committee
Editor-in-chief: Diego de Queiroz Machado
Evaluation by the double blind review system (SEER / OJS - version 3)

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ABSTRACT
Background: Applied professional research in public administration must produce traceable knowledge while translating findings into artifacts that are useful for public management. When this trajectory is linked to GovTech's pre-incubation tracks, it yields translation gains but also entails the risks of acceleration, discursive simplification, and premature prototyping.
Purpose: This article analyzes how pre-incubation can be integrated into applied GovTech research without subordinating diagnosis to market pressures. It proposes using a stage-gate integration model to preserve traceability, validity, and transferability.
Method: The study adopts a qualitative approach and has been designed as a case study of a project that focused on the administrative supervision of public service contracts involving exclusively dedicated labor. Its empirical basis was constructed in three layers: ten semi-structured interviews with contract inspectors and managers from two federal institutions in Rio Grande do Sul, Brazil, the data from which were placed on an empathy map; a co-creation workshop that produced a problem tree and a prioritization matrix; and pre-incubation artifacts, including the canvas, a pitch, mentoring records, and governance documents. Analysis combined statistical-lexical exploration in IRaMuTeQ, thematic coding in Taguette, and audit-trail tracing from evidence to interpretation, requirement, and artifact.
Results: Our findings show that pre-incubation improved the ability to translate operational pain points into requirements, priorities, and solution components, but also pressured for premature stabilization of the scope. We identified four stage-gates: diagnostic finalization, translation into requirements, progress toward prototyping, and transition to a pilot.
Conclusions: We demonstrate that the integration of applied research and pre-incubation can be methodologically governed, thus avoiding premature solutionism and strengthening the accountability of digital solutions in the public sector.
Keywords: design thinking; applied research; pre-incubation; GovTech; public innovation.

RESUMO
Contextualização: Pesquisas profissionais aplicadas em Administração Pública precisam produzir conhecimento rastreável e, simultaneamente, traduzir achados em artefatos úteis à gestão pública. Quando esse percurso se articula a trilhas de pré-incubação GovTech, surgem ganhos de tradução, mas também riscos de aceleração, simplificação discursiva e antecipação da prototipagem.
Objetivo: Este artigo analisa como a pré-incubação pode ser integrada a uma pesquisa aplicada em GovTech sem subordinar o diagnóstico a pressões de mercado, propondo um modelo de integração com *stage-gates* para preservar rastreabilidade, validade e transferibilidade.
Método: O estudo adota abordagem qualitativa e configura-se como estudo de caso sobre um projeto voltado à fiscalização administrativa de contratos com dedicação exclusiva da mão de obra. A base empírica foi construída em três camadas: dez entrevistas semiestruturadas com fiscais e gestores de duas instituições federais do Rio Grande do Sul que deram origem a um Mapa de Empatia; *workshop* de cocriação com produção de Árvore de Problemas e matriz de priorização; e artefatos da pré-incubação, como *Canvas*, *pitch*, registros de mentoria e documentos de governança. A análise combinou exploração estatístico-lexical no *IRaMuTeQ*, codificação temática no *Taguette* e rastreamento do *audit trail* entre evidência, interpretação, requisito e artefato.
Resultados: Os achados mostram que a pré-incubação ampliou a capacidade de converter dores operacionais em requisitos, prioridades e componentes de solução, mas também pressionou a estabilização precoce do escopo. Foram identificados quatro *stage-gates*: fechamento do diagnóstico, tradução em requisitos, avanço para prototipagem e transição para piloto.
Conclusões: O estudo contribui ao demonstrar que a integração entre pesquisa aplicada e pré-incubação pode ser metodologicamente governada, evitando solucionismo precoce e fortalecendo a *accountability* de soluções digitais no setor público.
Palavras-chave: *design thinking*; pesquisa aplicada; pré-incubação; GovTech; inovação pública.

RESUMEN

Contextualización: Las investigaciones profesionales aplicadas en Administración Pública necesitan producir conocimiento trazable y, al mismo tiempo, traducir hallazgos en artefactos útiles para la gestión pública. Cuando este recorrido se articula con trayectorias de preincubación GovTech, surgen beneficios de traducción, pero también riesgos de aceleración, simplificación discursiva y prototipación prematura.

Objetivo: Este artículo analiza cómo la preincubación puede integrarse a una investigación aplicada en GovTech sin subordinar el diagnóstico a presiones de mercado. Para ello, propone un modelo de integración con *stage-gates* orientado a preservar la trazabilidad, la validez y la transferibilidad.

Método: El estudio adopta un enfoque cualitativo y se configura como un estudio de caso sobre un proyecto dirigido a la fiscalización administrativa de contratos públicos con dedicación exclusiva de mano de obra. La base empírica fue construida en tres capas: diez entrevistas semiestructuradas con fiscales y gestores de contratos de dos instituciones federales de Rio Grande do Sul, Brasil, que dieron origen a un Mapa de Empatía; un taller de cocreación que produjo un Árbol de Problemas y una matriz de priorización; y artefactos de la preincubación, como Canvas, *pitch*, registros de mentoría y documentos de gobernanza. El análisis combinó exploración estadístico-léxica en *IRaMuTeQ*, codificación temática en *Taguette* y rastreo del audit trail entre evidencia, interpretación, requisito y artefacto.

Resultados: Los hallazgos muestran que la preincubación amplió la capacidad de convertir dolores operativos en requisitos, prioridades y componentes de solución, pero también presionó una estabilización prematura del alcance. Se identificaron cuatro *stage-gates*: cierre del diagnóstico, traducción en requisitos, avance hacia la prototipación y transición hacia el piloto.

Conclusiones: El estudio demuestra que la integración entre investigación aplicada y preincubación puede gobernarse metodológicamente, evitando el solucionismo prematuro y fortaleciendo la accountability de soluciones digitales en el sector público.

Palabras clave: *design thinking*; investigación aplicada; preincubación; GovTech; innovación pública.

How to cite this article:

Cabral, R. N., Tondolo, R. R. P., & Tondolo, V. A. G. (2026). A gated integration model for applied research in GovTech. *Contextus – Contemporary Journal of Economics and Management*, 24, e97092. https://doi.org/10.36517/contextus.2026.97092

1 INTRODUCTION

Applied professional research in public administration is facing a recurring dilemma: how to produce useful, traceable knowledge while converting the findings into artifacts that have potential institutional use. Given such arrangements, design thinking (DT) is attractive because it organizes the investigation into an action-oriented sequence — empathize, define, ideate, prototype, and test — and moves formal requirements closer to operational realities through co-creation involving users (Brown, 2020; Liedtka, 2018). The problem arises when the research trajectory begins to coexist with the entrepreneurial tracks in innovation or incubation programs. In such cases, communication materials, market validation, and business-model development may be mistaken for scientific prototyping, and prematurely shift the study from diagnosis to a solution before one is ready.

In the case we analyzed, this tension emerged during an applied research project that focused on the management and administrative supervision of public, exclusively dedicated labor (EDL) contracts. The Empathize phase revealed there to be documentary overload, fragmented workflows, difficulties in interpreting regulations, and concerns with accountability; the co-creation workshop converted this evidence into priorities; and participation in a pre-incubation track introduced entrepreneurial artifacts such as a canvas (a project-formulation matrix that summarizes the problem, the value proposition, and components of the solution) and the pitch (a condensed presentation of the proposal to external spokespeople), along with feasibility signals and activities in preparation for prototyping. At the same time, we were able to explore the potential dissemination of the solution by way of a GovTech initiative: a socio-technical arrangement for the public sector. The case, therefore, makes it possible to observe a real chain — evidence, interpretation, requirement, and artifact — and the tensions that arise when the analytical pace of the research encounters the pace of an entrepreneurial track.

The literature offers partial answers to this problem. Engaged scholarship explains how knowledge is co-produced by academia and practice (Van de Ven, 2007; Van de Ven & Johnson, 2006), but it does not establish the criteria for controlling how it is converted into artifacts under pressure to accelerate. DT organizes the progression from understanding to intervention, although the literature about it also recognizes conceptual heterogeneity and contingent outcomes (Johansson-Sköldberg et al., 2013; Micheli et al., 2019). Studies of boundary objects show how artifacts coordinate different social worlds (Carlile, 2004; Star & Griesemer, 1989), without defining when they are analytically ready to advance. Stage-gates, in turn, were conceived to manage product development (Cooper, 1990), not to protect empirical sufficiency and public accountability, which we here understand as the duty to justify decisions and be answerable for them, with the possibility of subsequent verification. Recent studies also indicate that the early stages of public innovation are formative and difficult to govern, and that innovation environments display heterogeneous arrangements of value, governance, and networks (Fred & Mukhtar-Landgren, 2026; Stoll & Andermatt, 2025).

Recent AI applications in administrative processes demonstrate the potential there is for reducing bureaucracy and improving information support (Souza & Carneiro, 2025). However, no clearly explained mechanism exists that authorizes, reviews, restores or interrupts the transition from scientific diagnosis to pre-incubation based on empirical sufficiency, analytical coherence, traceability, and public accountability. This is the gap this article addresses: not the absence of innovation tools or methods, but the absence of explicit criteria for governing the transition from research to solution.

This leads to the following research question: How can the transition between applied research and GovTech pre-incubation be governed to preserve the link between evidence, requirements, and solution artifacts? Our objective was to analyze this transition in a case involving the supervision of public contracts and to propose an integration model with stage-gates to discipline the transitions between diagnostic completion, translation into requirements, prototyping, and pilot preparation.

Our contribution is threefold. In terms of theory we distinguish between ordering the trajectory — a function performed by DT — and governing the transition, a function that is assigned to the gates. Methodologically, the model combines an audit trail and decision criteria to make the evidence–interpretation–requirement–artifact chain reconstructable. In practical terms, we provide the criteria needed for researchers, managers, and innovation programs to decide when to move forward, review, return, or suspend the trajectory of a GovTech solution, without confusing communication or feasibility materials with scientific validation. The remainder of this article develops this argument and divides it into four key components. The theoretical framework organizes these four conceptual strands as a function of the proposed mechanism by distinguishing between ordering the governing trajectory and the transition. This methodology justifies the use of a process-oriented single case and the auditable chain of evidence that supports the analysis. The five findings of our results show how the decision gates emerged from the empirical trajectory. The discussion compares our model with recent literature and defines the conditions under which it is can be applied, while the conclusion summarizes the study's contributions and limitations, and suggests a future research agenda.

2 THEORETICAL FRAMEWORK

2.1 Applied research and engaged scholarship

This study begins with the gap that exists between research and practice. A substantial body of management literature recognizes that academic knowledge often achieves significant analytical consistency, but does not always reach the decision-makers and administrators in time, or in the language and format needed to take public action (Bansal et al., 2012; Bartunek & Rynes, 2014). This distance is especially relevant in applied professional research, in which the knowledge produced is not limited to explaining phenomena but also seeks to support decisions, improve processes, and guide interventions in real-life organizational contexts.

In response to this tension, engaged scholarship holds that real problems should be investigated by systematic interaction with those working in the field to produce knowledge that is relevant to both theory and practice (Van de Ven, 2007; Van de Ven & Johnson, 2006). From this perspective, the quality of any applied research is assessed not only in relation to its internal consistency but also by how it organizes dialogue, co-production, situated validation, and traceability during the research process.

This formulation is important to this article because the link between applied research and pre-incubation cannot be treated as a mere operational extension of the study. On the contrary, it is a hybrid arrangement that requires explicit mediation between producing knowledge, translating the evidence, constructing communication artifacts, prioritizing, and decision-making. In this type of trajectory, proximity to those in the field increases the practical relevance of the research but also requires mechanisms that preserve the distinction between empirical evidence, analytical interpretation, and the formulation of solutions.

Engaged scholarship, therefore, provides the conceptual basis for understanding applied research as the production of action-oriented knowledge, but knowledge that is disciplined by criteria of evidence, co-production, situated validation, and auditability. The argument we develop in this study lies at the intersection of practical relevance, the progressive translation of evidence, and the need for traceability. We develop this point in the next section by treating DT as a discipline of analytical ordering: that is, as a mechanism for temporally organizing the transition from empathy to definition, ideation, and the subsequent prototyping.

2.2 Design thinking as a discipline of analytical ordering

In this article we treat DT not only as a creative method oriented toward innovation but also as a discipline for analytically ordering the research process. In widely its disseminated formulations, DT organizes the investigation as an action-oriented sequence — empathy, definition, ideation, prototyping, and testing — and moves the formulation of solutions closer to the real needs of the users (Brown, 2020; Liedtka, 2018). Its usefulness in this study, however, lies not only in its ability to stimulate creativity or co-creation, but also for imposing a temporal logic on the analytical trajectory, thereby preventing the solution from preceding a minimum consolidation of the problem.

This function is particularly important in applied research that operates simultaneously in complex, highly-regulated organizational contexts, such as public administration, and in entrepreneurial pre-incubation tracks focusing on rapid validation, communicability, and signs of feasibility. In such an arrangement, the urgency to respond to concrete public problems combines with pressure from the entrepreneurial track for clear, applicable formulations, and this may lead to a premature shift from diagnosis to the development of a solution. When this occurs, the risk is not merely methodological but also analytical: the research will tend to become less sensitive to the ambiguities of the phenomenon, to institutional tensions, and to dimensions of the problem that have not yet been sufficiently stabilized. DT is therefore used in this article as a mechanism for curbing any premature solutionism.

Brown (2020) and Liedtka (2018) show that progression between phases is not merely an operational sequence but a means of disciplining the movement between understanding and intervention. The Empathize phase is particularly relevant because it enables the pain points, routines, perceptions, and constraints of the actual work to be explained before these elements are rewritten in product language. The Define and Ideate phases are important because they serve as intermediate refinement spaces, in which the problem is reframed, prioritized, and translated into action possibilities without the research relinquishing its analytical openness at this stage. In dialogue with recent discussions on design in the public sector, this sequencing also helps explain why the adoption of DT should not be reduced to a mere workshop repertoire, but should instead be mobilized as a cognitive infrastructure of applied innovation (Brinkman et al., 2023; Mintrom & Luetjens, 2016; Tessarolo et al., 2021).

Accordingly, we deal with DT here as a methodological operator of the transition from empirical evidence to a solution artifact. Its function is to advance prototyping as being conditional on the relative finalization of the diagnostic stages while preserving the empathize–define–ideate–prototype sequence.

DT organizes the progression from understanding to intervention, but in its most widely disseminated formulations, it does not specify a particular consolidated decision regime for authorizing the transition between phases that is based on empirical sufficiency, analytical coherence, and a justifiable record of the decision taken. This limitation must be cautiously

formulated, because the literature has different conceptions of the essential attributes of this approach, their applicability, and their outcomes (Johansson-Sköldberg et al., 2013; Micheli et al., 2019). It is this difference between ordering the trajectory and specifying formal transition criteria that justifies the use of stage-gates. Originally conceived to manage new product development from idea to launch (Cooper, 1990), we reinterpret them in this article as epistemological-methodological gates situated at the boundary between applied research and pre-incubation, thus making progress conditional on there being sufficient evidence, a coherence between diagnosis and artifact, and the traceability of the decisions.

2.3 Boundary objects, knowledge mobilization, and stage-gates

The link between research and pre-incubation requires a theoretical basis that can explain how knowledge produced in one domain circulates in another without completely losing its link to empirical evidence. In this regard, the concept of boundary objects is useful for understanding artifacts that enable coordination between different social worlds without requiring full consensus. In this study, the canvas, pitch, empathy map, problem tree, and prioritization matrix are treated as artifacts of this kind: they are stable enough to maintain a link to the diagnosis and sufficiently flexible to move between research, public management, and the entrepreneurial context (Carlile, 2004; Star & Griesemer, 1989).

Stage-gates are also understood as formal transition points between stages, at which the presence of sufficient evidence, analytical coherence, and traceability is assessed before authorizing an artifact to advance (Cooper, 1990). Their function in this article is epistemological: they are used to regulate the transition between diagnosis, translation, and prototyping.

2.4 The entrepreneurial university, GovTech, and public innovation

The convergence of applied research and pre-incubation also features in the debate about the entrepreneurial university and the co-production of innovation. In the literature on this, the production of knowledge is no longer confined to academia; it is shaped by hybrid ecosystems in which universities, government, and markets interact more intensively (Etzkowitz & Leydesdorff, 2000; Perkmann et al., 2013). The creation of solutions for the public sector is central to such arrangements, and takes this study into the realm of GovTech, which is understood as an ecosystem of technologies aimed at transforming government processes and services (Bharosa, 2022; OECD, 2024).

From this perspective, the analysis of solution artifacts cannot be separated from the conditions that govern their translation for the public sector, including requirements for governance, responsible adoption, institutional capacity, and accountability. Taken together, these four strands frame the links between applied research, DT, boundary objects, and digital public innovation as a problem of methodological governance, rather than merely a trajectory that runs parallel to the development of a solution. The issue here is not only recognizing that applied research can coexist with entrepreneurial trajectories, but also explaining how this can be governed without the market logic replacing the diagnostic logic. The integration model we propose is situated precisely at this intersection between applied research, DT, boundary objects, and digital public innovation.

3 METHODOLOGY

3.1 Study design and unit of analysis

We adopted a qualitative, exploratory-analytical approach in this article and designed it as a qualitative single-case study (Baxter & Jack, 2008), which is an appropriate strategy for investigating a contemporary phenomenon in depth within its context and for mobilizing multiple sources of evidence (Yin, 2015). The process we used derives from the interest we have in reconstructing how evidence, interpretations, requirements, and artifacts are linked and transformed over time (Faccin et al., 2023). The case was purposively selected because it combines within a single observable trajectory four conditions that are rarely documented together: applied professional research, the sequential use of DT, a 14-week participation in a pre-incubation program, and the preservation of records that enabled us to reconstruct the transitions between data, interpretation, requirement, and artifact. We chose the case for its analytical relevance for examining a contemporary tension in public administration — producing a useful solution without ending the analysis prematurely — rather than for statistically representing the universe of GovTech initiatives. The unit of analysis is the governance of transitions between research and pre-incubation; the software being developed provides the context and is a product of the trajectory, but is not the primary unit of analysis.

The empirical basis for this trajectory was built in three stages. The first corresponds to the Empathize phase of DT, and comprises ten semi-structured interviews with administrative inspectors and contract managers dealing exclusively with labor matters at two federal institutions in Rio Grande do Sul, Brazil. Participants were recruited by purposive sampling based on their closeness to the phenomenon being investigated and their direct involvement in managing or supervising labor contracts. We made initial contact with the heads of the departments involved to present our research objectives and

identify the federal employees who are directly engaged in contract management and supervision. We then sent invitations directly to potential participants, who received information about the study and participated after providing us with their informed consent.

Researchers conducted the ten interviews in September 2025, each of which lasted 18 minutes, on average, but ranged from 6 minutes to 1 hour and 10 minutes. The interview guide was organized into five blocks: (i) opening and confirmation of informed consent; (ii) professional profile, including position, length of experience, and the number of contracts for which the participant was responsible; (iii) the current work process, focusing on monthly routines, the most time-consuming documents, and examples of non-compliance; (iv) perceptions of generative AI, with an emphasis on any gaps in automation, trust criteria, and perceived risks; and (v) finalizing, including the competencies considered essential for contract managers and supervisors and an opportunity for additional comments.

The interview guide was derived from the objectives of the Empathize phase, with each block corresponding to a dimension of the diagnosis: the characteristics of the participants' functions; the routine and documentary workload of their supervision activities; their perceptions of automation, and the criteria used for trusting artificial intelligence solutions; and the competencies they considered essential to the role. We discussed the instrument with the supervisors, and it formed part of the research project we assessed during the qualification examination of the graduate program to which the study is linked. The examining committee offered suggestions that were incorporated into the final version of the guide before we carried out the interviews.

The participants' profiles were characterized by their roles, the institution where they worked, and their experience with contracts. We did not collect their ages because this was not included in the interview guide and was unnecessary in terms of the study's analytical objective, which focused on experience in the function, position in the management–supervision process, and organizational variations between the institutions.

We assessed whether the ten interviews were sufficient using the logic of information power (Malterud et al., 2016), according to which corpus adequacy depends on the focus of the objective, sample specificity, dialogue quality, the theoretical basis, and the analytical strategy. The study does not seek to estimate prevalence, nor does it claim to offer any statistical generalizability. The corpus included participants who are directly involved in the phenomenon at two organizations, and who have comparable routines and experience ranging from 12 months to 18 years. We examined thematic recurrence by combining statistical-lexical analysis, interpretive coding, the rereading of excerpts, and triangulation with the empathy map, problem tree, prioritization matrix, and pre-incubation artifacts. The adequacy of the material is therefore supported by information power and triangulation, rather than by the percentage of classified segments or a retrospective claim of saturation.

The second layer corresponds to workshop G1, which was held at a federal university and operationalized the Define and Ideate stages and produced the problem tree, HMW questions, and the prioritization matrix we used to translate evidence into requirements and artifacts. Although a second workshop was subsequently held at a federal institute, it does not form part of the primary analytical basis of this article because it occurred after pre-incubation certification and thus falls outside the chronology of the methodological links we are examining here. The third layer consists of pre-incubation artifacts and records, which we treated as complementary evidence for observing how the research language was rewritten in terms of product, feasibility, and implementation. Table 1 presents the profiles of the participants we interviewed during the Empathize phase.

Table 1
Participant profiles

Attribute	Characterization
Number of participants	10 interviewees
Institutions	Two federal institutions in Rio Grande do Sul, Brazil
Roles	Administrative contract inspectors and contract managers
Recruitment	Initial contact with department heads followed by direct invitations to participants
Inclusion criterion	Direct involvement in EDL contract management or supervision routines
Contract-related experience	Ranging from 12 months to 18 years, with an approximate median of 7 years

Source: developed by the authors.

3.2 Production and preparation of evidence

The interviews were transcribed by one of the researchers with support from Google Meet's automated transcription app. This was followed by a manual review to verify content, correct inaccuracies, and prepare the material for analysis. We combined the transcripts into a single corpus, standardized them minimally for spelling, pseudonymized the participants' data, and removed any irrelevant features of the spoken language. We also excluded the interviewers' statements for lexical processing purposes. The material was then encoded using UTF-8 and prepared for automatic segmentation into

elementary context units (ECUs) in IRaMuTeQ. We analyzed the Empathize phase interviews in two complementary stages. We first explored the material statistically and lexically in IRaMuTeQ (version 0.8 alpha 7) using descending hierarchical classification, which grouped the corpus segments into classes based on the co-occurrence of terms (Camargo & Justo, 2013). It was then manually coded in Taguette (version 1.5.0-1-ga0a9a79), using the lexical classes as initial categories, and representative excerpts were interpreted in more depth (Rampin & Rampin, 2021). This process yielded five thematic dimensions related to management and supervision work: document-checking routines; interpreting legislation and the challenges of the managerial role; everyday practices and improvisation; monitoring charges and linking occurrences to deductions; and events involving personnel. We classified 76.43% of all the segments, indicating adequate lexical utilization of the descending hierarchical classification, and retained more than two-thirds of the processed corpus. We interpreted the classes during the Empathize phase by combining IRaMuTeQ's statistical-lexical results with thematic coding in Taguette, and rereading representative excerpts taken from the interviews. This interpretation provided us with information for the empathy map, which summarized the participants' pain points, goals, tasks, and perceptions. The map was subsequently used as input for the Define and Ideate phases, thus making it possible to trace how the Empathize findings were translated into problems, priorities, requirements, and components of the solution (Bardin, 2016; Camargo & Justo, 2013; Rampin & Rampin, 2021).

We consolidated the synthesis of the Empathize phase into an empathy map that outlined the participants' pain points, goals, tasks, and perceptions. Participants were provided with the material in workshop G1 as a common input for constructing the problem tree and prioritizing solutions. Our decision to use the same participants and same inputs served a methodological purpose: it reduced information asymmetries and kept the empathize–define–ideate sequence anchored in shared evidence.

Workshop G1 comprised two complementary parts. In the first, participants discussed two preliminary problem statements, refined them, and selected the one that best captured the pain points of their current work. In the second, they devised HMW questions and evaluated solutions using an impact–effort matrix. This process produced a clear hierarchy of priorities: improving supervision routines was seen as a high-impact, low-effort intervention; implementing well-defined workflows emerged as a structuring initiative; and the knowledge repository and training cycles were seen as being important complementary measures, albeit with different effort–impact relationships. The project formulation matrix (canvas) was subsequently prepared as an artifact to synthesize and methodologically translate this evidence by linking the results of the Empathize, Define, and Ideate phases that were already available when the project entered the pre-incubation stage. This material was decisive because it provided the entrepreneurial track – not a generic list of ideas, but one with the priorities already refined by experienced field users.

3.3 Links with pre-incubation

The pre-incubation track served as an environment for translating, challenging, and initially refining evidence, rather than as a substitute for the research stages, or as scientific validation of the artifact. The university pre-incubation program lasted 14 weeks and helped develop the problem, the value proposition, and an initial design of the solution. Its entrepreneurial training platform offered a modular journey covering problem discovery, exploration with users, a preliminary representation of solutions, business modeling, and economic and financial feasibility.

Records of the four mentoring sessions were also incorporated into the corpus, with concise notes on the topics that were discussed and the actions to be taken. These records were particularly important because they documented the translation of the data-protection requirements into minimum governance artifacts for the pilot, such as draft Terms of Service, and Technical Cooperation Agreement, a data inventory, and a data retention and disposal policy. The entrepreneurial track also enabled us to develop the product pitch for the digital solution.

3.4 Analytical strategy, reflexivity, and rigor

Based on the audit trail defined in the preceding section, the analytical strategy traced how interviews, analytical syntheses, workshop decisions, translation artifacts, and pre-incubation documents were connected throughout the trajectory. Analysis sought to answer three questions: What translation gains did pre-incubation offer the research; What market-related tensions did it introduce; and What type of stage-gate was required to preserve the methodological sequence?

The study adopted four rigor safeguards: a systematic rereading of key excerpts from the corpus; maintenance of an audit trail comprising coding spreadsheets, analytical memos, workshop materials, artifact versions, and mentoring records; triangulation of the lexical analysis, thematic coding, and artifacts produced in the Define and Ideate phases; and member checking — verifying interpretations with the workshop participants themselves. After the interview phase and preparation of the preliminary Empathize syntheses, the researcher once again presented their initial interpretations to the participants, who were able to confirm, adjust, and examine them in greater depth together. Participant feedback thus served as a mechanism for analytical refinement and co-creating priorities and solutions.

We used generative AI tools only as auxiliary support in drafting and revising the manuscript; they were not used to generate data, define categories, produce results, or make interpretive decisions. As the authors, we critically reviewed all the suggestions we received and assume full responsibility for the manuscript's final content.

All the participants provided their informed consent, and the materials we used in the analysis were pseudonymized by removing direct personal identifiers, third-party names, and institutional references that could enable indirect identification. As for the project's ethical framework, we treated the interviews as consultations on professional opinions and perceptions, but without collecting any sensitive data, identifying participants in the results, or disclosing any individual conduct, performance, or employment affiliation. Regarding reflexivity, the article acknowledges that because of the researcher's participation in the pre-incubation phase there was a risk of confirmation bias; that is why entrepreneurial artifacts were treated as objects of analysis and contrast rather than as automatic proof of the validity of the solution.

4 ANALYSIS AND DISCUSSION OF THE RESULTS

The presentation now describes the sequence linking evidence from the Empathize phase, the artifacts produced in workshop G1, and the materials generated during the pre-incubation track. Although the project was later expanded by way of a new workshop at another institution, the analytical scope of this article remains centered on the chronology of the bridge between research and pre-incubation — that is, on how evidence already stabilized at that point in time came to be reflected in requirements, artifacts, and transition criteria between the logic of the research and the logic of pre-incubation.

4.1 Translation gains: when pre-incubation expands the research

The first finding was that the pain points that were identified during the Empathize phase reappeared in subsequent requirements and artifacts, but not by automatic transposition. The trajectory involved selection, interpretation, and collective decision-making. For example, the impact–effort matrix developed in workshop G1 classified improvements to supervision routines as a high-impact, low-effort solution, while well-defined workflows were treated as a structuring initiative. This intermediate prioritization is important because it shows that the canvas was not constructed directly from raw interviews: it was preceded by documented syntheses and choices.

The first empirical chain began with the manual work scale. Participant E3 said: "There are about 40-something employees. Looking at all the pay slips [...] I do all this administrative work manually [...] in Excel." This statement was associated with operational overload and, after being confirmed on the empathy map and prioritized in the workshop, supported the requirement for a digital checklist validated by pay slips, the National Social Security Institute (*INSS*) contributions, and Time of Service Guarantee Fund (*FGTS*) deposits. The sequence demonstrates the function of Gates 1 and 2: stabilizing the diagnosis and demanding that the requirement remains linked to the evidence from which it originated.

The second chain came from workflows being fragmented. E5 stated: "We're still very dependent on email today [...] it's partly in email, partly in BEM." This account did not only lead to a generic idea of centralization; it was compared with the problem tree, which recorded low integration and the dispersion of information, and with the priority structuring of workflows. The result was the proposal to set up a knowledge repository, document the workflow, and organize the initial backlog.

The third chain introduced a constraint in the solution itself. E1 warned that when document formats change, "everything we've done is lost," while E5 made trust conditional on the existence of a document base: "It needs to have the law, [...] the contract [...] and an account of what occurred." These data prevented pre-incubation from treating the prototype as a stable solution and supported Gates 3 and 4: progress will depend on testing variations in the documents, specifying the sources used, ensuring human supervision, and defining minimum governance artifacts. Public responsibility also emerged as a substantive criterion. It was summarized by E1 when they emphasized the need to "think about public service, think about avoiding losses to the public treasury."

Table 2 summarizes additional correspondences between evidence, interpretation, and solution components. The interview excerpts do not only serve an illustrative function; they enable readers to reconstruct why a given requirement was retained, reformulated, or made conditional by a gate.

Table 2
Micro-level traceability between evidence, interpretation, and solution artifacts

Underlying evidence	Interpretation	Artifact translated in the pre-incubation track
Interview excerpt: item-by-item checking of pay slips, and a high volume of documents	Operational pain point, overload, risk of human error, and rework	A canvas component focusing on a digital checklist with validation and a guided checking routine
Empathy map: fear of being held accountable for process failures	Need for traceability, justification, and decision reconstruction	Requirement for an auditable trail, log record, and an explanation of the basis for action

Problem tree: reduced integration, manual procedures, and fragmented regulatory information	A systemic, rather than a merely instrumental, problem requiring standardization and the centralization of information	Proposal for documented workflows, a knowledge repository, and organization of the initial backlog
Impact–effort matrix from workshop G1	Ranking of priorities and identification of quick wins	Initial prioritization of supervision routines, workflows, and low-effort, high-impact components

Source: developed by the authors based on interviews, Empathy map, problem tree, and prioritization matrix from workshop G1.

This finding supports the inference that artifacts can serve as boundary objects by enabling knowledge to circulate between research, management, and pre-incubation (Carlile, 2004; Star & Griesemer, 1989), while also refining this literature: in the case we studied, circulation only became methodologically defensible when each component could be traced back to the evidence, interpretation, and decision that produced it. Our empirical contribution, therefore, is not merely to show that translation occurred, but also to demonstrate the conditions under which it remained auditable.

4.2 Productive tensions: when pre-incubation puts pressure on analysis time

The second finding concerned the presence in the pre-incubation documentation of temporal and discursive pressures and success criteria that diverged from the logic governing the research. The pre-incubation materials began to feature synthetic problem, value proposition, persona, pitch, and feasibility sign formulations. In contrast, the research trajectory depended on the relative finalization of the Empathize, Define, and Ideate phases to stabilize the priorities and prevent premature prototyping.

These differences emerged on three levels. Temporally, the entrepreneurial track operated with rapid formulation and delivery milestones. Discursively, the pitch required the problem to be condensed into concise, communicable, and persuasive language. In terms of criteria, pre-incubation records began to emphasize the clarity of the proposal, the preliminary representation of a solution, and feasibility signs, while the research was still anchored in evidential coherence and the traceability of the transition from data to interpretation and artifact. Table 3 summarizes these points of convergence and divergence.

Table 3
Convergence and divergence between research (DT) and pre-incubation

Dimension	Convergence points	Divergence points (points of tension)
Problem formulation	Pre-incubation reinforced the need to state the problem clearly and in testable terms	The demand for communicative clarity exerted pressure to stabilize the problem more rapidly than the research could authorize
Translation of findings into requirements	The canvas and pitch enhanced the transition from evidence to solution components	Translation risked becoming a market narrative before finalizing the analysis
Pace of work	Structured programs helped organize the milestones and deliverables	The accelerated pace placed pressure on the empathize–define–ideate sequence before scientific prototyping
Success criterion	The two trajectories converged around the practical usefulness of the findings	Pre-incubation valued feasibility and communication; research valued traceability and evidential coherence
Governance of the pilot	Mentoring made data-protection requirements and minimum documents for adoption visible	Legal and operational formalization could not be confused with scientific validation of the artifact

Source: developed by the authors based on records of the pre-incubation trajectory and research artifacts.

These results align with recent literature that characterizes the early stages of public innovation as formative, multifaceted, and difficult to control (Fred & Mukhtar-Landgren, 2026). They also accord with Stoll and Andermatt (2025), who argue that innovation environments differ in value, governance, and networks and cannot be treated as homogeneous arrangements. Our case adds an observable mechanism: pressure to accelerate did not appear as merely an abstract environmental characteristic, but materialized when problems, priorities, and uncertainties had to be condensed into a canvas, pitch, and feasibility signs.

4.3 Stage-gates as a mechanism of methodological governance

The third finding of the trajectory we analyzed was the formalization of four criteria of the transitions between phases and artifacts, which operate as methodological stage-gates. The first gate corresponded to the relative finalization of the diagnosis, when evidence from the Empathize phase was synthesized on the empathy map, problem tree, and prioritization matrix. The second gate corresponded to the controlled conversion of the findings into requirements, when the canvas and pitch began to function as translation instruments without replacing the Define and Ideate stages. The third gate corresponded to the deliberate postponement of the legal formalization of the startup and progress toward a minimum

viable product (MVP), understood as the first minimally functional version to be tested with real users or in a pilot environment, with both remaining as stages subsequent to the requirements maturing. The fourth gate corresponded to the transition to the pilot, when mentoring records and data-protection artifacts began to be treated as preconditions for adoption.

Table 4 summarizes these transition criteria.

Table 4
Stage-gates in the integration between research and pre-incubation

Gate	Risk contained	Transition criterion
Gate 1 — Finalization of the diagnosis	Jumping from empathy to a solution while the problem is still unstable	The existence of a traceable synthesis of the corpus in the empathy map, problem tree, and prioritization matrix
Gate 2 — Translation into requirements	Confusing market materials with scientific evidence	Each component of the canvas and proposed solution must refer back to a pain point, risk, or documented priority
Gate 3 — Progress toward prototyping	Premature development of the MVP and early “freezing” of the scope	Robust prototyping conditional on finalizing the Define and Ideate phases, and a record of this consolidation in the audit trail
Gate 4 — Transition to the pilot	Treating adoption as a purely technical issue	The formalization of minimum governance artifacts, data protection, and institutional roles

Source: developed by the authors.

Figure 1 presents the model as a decision sequence. The gates do not eliminate the iterative nature of DT; they make clear the decision to advance, review, return, or halt the trajectory, and record the basis for each transition.

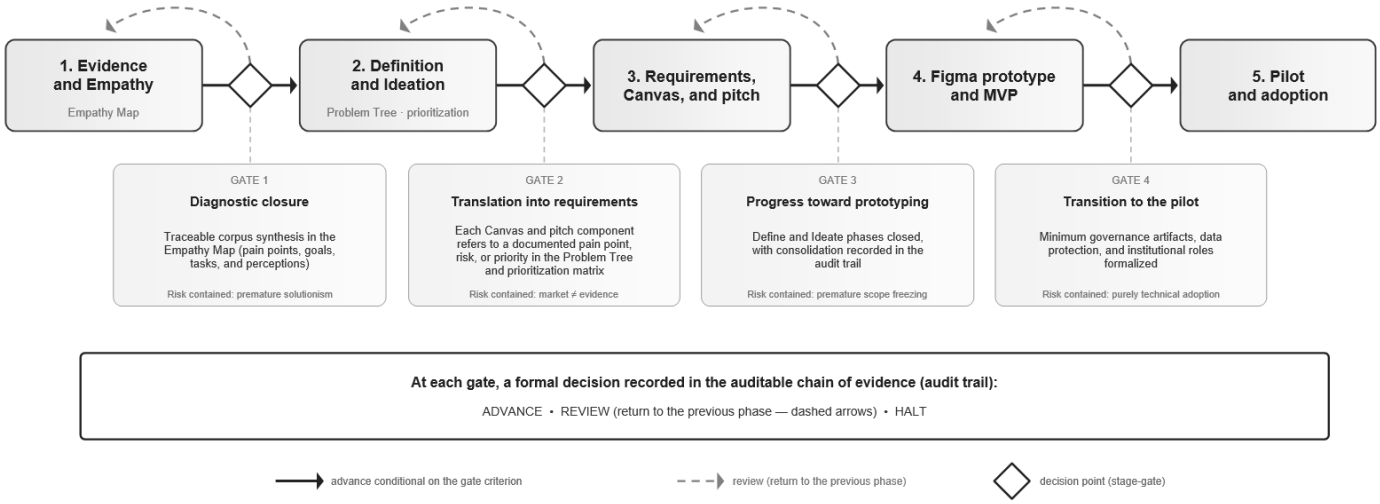

Figure 1. Stage-gate integration model linking applied research and GovTech pre-incubation.
Source: developed by the authors based on interviews, the G1 workshop, pre-incubation artifacts, and mentoring records.

4.4 Governance of the pilot: when translation reaches the institutional level

The fourth finding was that mentoring records and preliminary pilot documents showed that the transition to institutional adoption could not be reduced to the technical availability of the prototype. The four mentoring sessions covered draft Terms of Service and a Technical Cooperation Agreement, the data inventory, the retention and disposal policy, an operations-log model, and the definition of responsibilities. Although these materials were not yet final documents, they made the requirements that needed to be met before the pilot visible.

Table 5 summarizes the minimum governance artifacts identified for this transition.

Table 5
Minimum governance artifacts identified for the transition to the pilot

Artifact	Analytical function	Function on adoption
Terms of Service and Technical Cooperation Agreement	Making roles, limits of use, and responsibilities visible	Preparing formalization of the controller–operator relationship
Data inventory and retention/disposal policy	Specifying what enters the system and why	Supporting data minimization, access control, and definition of the retention period
Operations log model and audit trail	Connecting process explainability to the research	Supporting the auditability of use and decision reconstruction

Incident-response plan and operator/sub-operator clauses	Showing that adoption involves an institutional chain, not merely a tool	Reducing risk and structuring responsibilities in the event of an incident

Source: developed by the authors based on mentoring records and drafts produced in the pre-incubation context.

The empirical evidence coincides with that of Weigl et al. (2024), who identify tensions between user-centricity and public values, particularly accountability, representation, and pluralism. In the case we analyzed, the response was not to abandon user orientation but to subordinate it to institutional criteria: a verifiable documentary basis, human supervision, data protection, defined roles, and the possibility of reconstructing the decision. So Gate 4 translates public values into operational transition conditions.

4.5 From the workshop to the canvas: the controlled stabilization of priorities

The fifth finding was that the canvas was developed from priorities already established in workshop G1 rather than directly from raw interviews. In the impact–effort matrix, improving supervision routines was classified as a high-impact, low-effort solution; well-defined workflows emerged as a structuring initiative; and we retained the knowledge repository as a complementary component. These choices reappeared in the canvas as a digital checklist, validation, documented workflows, and a repository with explainable AI. So the artifact served simultaneously as a translation of the solution and a verifiable record of the connection between pain points, risks, priorities, and design components — the same connection required by Gate 2. This trajectory combines innovation-oriented process improvement with preparation for more persistent changes, which is a movement compatible with the coexistence of different digital innovation strategies in the public sector, as identified by Guenduez et al. (2025). Our research data, however, add one condition: the combination of strategies remained coherent only because the priorities could be traced back to decisions made in the workshop.

5 DISCUSSION

Our results support interpreting pre-incubation not as a simple stage that is parallel to the research trajectory, but as an additional environment for translating, pressuring, and rewriting the evidence. The central point is not merely that applied research and entrepreneurial tracks can coexist, but to show that this coexistence causes different effects on the methodological sequencing. On the one hand, it expands the capacity to translate pain points, risks, and priorities into the language of requirements, value propositions, and solution components. On the other, it introduces pressures for acceleration, discursive simplification, and premature stabilization of the scope. It is precisely this ambivalence that gives rise to the need for explicit methodological governance.

5.1 The translation of evidence and containment of premature solutionism

The main implication of these results is that pre-incubation should be analyzed as an environment of translation and pressure, rather than as a stage that is external to the research, or automatically beneficial to it. The data confirm that DT facilitates the transition from user needs to possibilities for action (Brown, 2020; Liedtka, 2018), but they also qualify this expectation: co-creation alone does not prevent ambiguities from being compressed prematurely. In the case we studied, protecting the diagnosis depended on intermediate syntheses, documented prioritization, and the ability to return to excerpts taken from the interviews.

This result means that the findings of the case are closer to those of Fred and Mukhtar-Landgren (2026), who describe the early stages of public innovation as formative processes in which actors construct the narratives, roles, and coalitions. There is, however, an important difference: while those authors emphasize the discursive formation of innovation, our study identifies the methodological point at which narrative may become detached from the evidence — the conversion of diagnosis into solution artifacts. Pre-incubation was useful when it required synthesis and communicability, but it became a risk when the clarity of the pitch began to press to finalize issues that were still open in the corpus.

Our contribution, therefore, is less celebratory and more conditional. Stoll and Andermatt (2025) show that public innovation environments exhibit distinct configurations of value, governance, and networks; their existence therefore guarantees neither innovation capacity nor the authority to disseminate solutions. The case we analyzed reinforces this caution and adds that the external track should be incorporated into the methodological object of the research itself. When its deadlines, deliverables, and criteria remain outside the audit trail, the solution may appear to be a natural consequence of the diagnosis; when they are documented, they are open to critique, review, and accountability.

5.2 Stage-gates as a mechanism of methodological governance

The second central implication is that integration depended on explicit transition criteria rather than merely on the goodwill of the participants. DT ordered a progression between Empathize, Define, Ideate, and Prototype; the stage-gates added a decision regime governing transitions. This distinction is supported by the data: the diagnosis only advanced after being synthesized in the empathy map, problem tree, and prioritization matrix; the requirements had to refer back to a

documented pain point, risk, or priority; the prototype was made conditional on the scope maturing; and the pilot required minimum governance artifacts.

This finding coincides with that of Cooper (1990) but shifts the stage-gate away from its original function in product development. Rather than predominantly assessing attractiveness, feasibility, and commercial readiness, the proposed gates verify empirical sufficiency, coherence between diagnosis and requirements, documentation of the decision, and compatibility with public values. The novelty, therefore, lies not in the existence of decision gates, but in their reinterpretation as epistemological and methodological safeguards at the boundary between applied research and GovTech pre-incubation.

The four gates also address different risks, which avoids the framework being reduced to a graphic sequence. Gate 1 contains the jump from empathy to the solution; Gate 2 stops the canvas and pitch from being treated as scientific evidence; Gate 3 contains the premature freezing of the scope; and Gate 4 prevents adoption from being conceived as a purely technical matter. Together, they preserve the research's own temporal requirements without blocking experimentation, because each decision may result in advancing, reviewing, returning, or halting the trajectory.

5.3 Boundary objects, institutional adoption, and the governance layer

The third analytical implication stems from the role artifacts play throughout the trajectory. The results suggest that the canvas, pitch, problem tree, prioritization matrix, and preliminary governance documents functioned as boundary objects; that is, as artifacts that are sufficiently stable to maintain a link to the diagnosis and sufficiently flexible to move between research, public management, and the entrepreneurial context (Carlile, 2004; Star & Griesemer, 1989). This finding is relevant because it shifts the interpretation of the article: the problem is not the existence of hybrid artifacts but the absence of mechanisms for reconstructing how they were produced, translated, and reused.

This argument also resonates with the study by Santos et al. (2025), which analyzed the use of ChatGPT from a socio-material perspective. The authors show that generative AI not only automates tasks but also reconfigures practices, roles, and workflows, thereby generating efficiency gains while creating new demands for adaptation and digital competencies. A similar shift appears in this case when the canvas, pitch, mentoring records, and governance documents cease to be merely auxiliary products and begin to mediate the relationship between empirical evidence, solution requirements, and the institutional conditions for adoption.

The case here analyzed, therefore, shows that pre-incubation not only expanded the functional translation of the solution, but also the visibility of the institutional conditions for adoption. This result broadens the article's contribution. The integration of research and pre-incubation did not merely produce a faster path to a solution; it made more visible the fact that a solution in the public sector depends on a layer of institutional adoption. Rather than diluting the rigor of the research, this layer strengthened our central argument: when the entrepreneurial track is governed, it helps reveal the preconditions for legitimacy, not just the requirements for functionality.

The mentoring sessions and pilot-preparation documents revealed that the transition from requirement to use in the public sector depends on more than interface, automation, or value proposition. It requires roles, accountability, data-retention, auditable justification, and a minimum definition of the relationships between controllers, operators, and users. This additional layer returns the discussion to governing the adoption: the solution is not merely technical but also socio-technical and institutional.

This point links this article to the literature on digital public innovation and artificial intelligence governance, which holds that efficiency gains and user orientation must coexist with human supervision, transparency, data protection, and accountability (Bharosa, 2022; OECD, 2024; Stilgoe et al., 2013; Valle-Cruz et al., 2019; Wirtz et al., 2020). Weigl et al. (2024) demonstrate that user-centricity may conflict with public values; the data from this study present one possible response to this problem. In the case we analyzed, requirements for a verifiable documentary basis, operational logging, data retention, defined roles, and human review did not appear as external additions to the prototype but as conditions for its transition to the pilot. So when pre-incubation is methodologically governed it can make institutional requirements visible that would remain abstract if the research were limited to diagnosis, thereby converting public values into verifiable transition criteria.

5.4 Conditions of applicability and analytical contributions of the case

The transferability we claim in this article is analytical rather than statistical: the model offers propositions and criteria that can be examined and recalibrated in other projects without presupposing that the four stage-gates can be automatically replicated. Its applicability derives from the conditions we observed in the case and from the possibility of comparing the evidence–interpretation–requirement–artifact chain in analogous contexts.

The model is likely to be most useful when four conditions coexist: (i) the public problem is operationally complex and there is an accountability risk; (ii) the applied research needs to generate requirements, workflows, prototypes, or governance documents; (iii) there is external pressure for acceleration, communicability, or the demonstration of feasibility; and (iv) there is a minimum capacity for documentation. These conditions were not deduced in an abstract way. In this particular case, they appeared in the volume of documents and concerns about losses to the public treasury; the need to

convert interviews into the components of a solution; the pace of the pre-incubation phase; and the availability of transcripts, codes, workshop materials, canvas versions, and mentoring records.

Direct application is more plausible in professional research that crosses the boundary between diagnosis and the development of a solution. In other domains, the names of the artifacts and substantive criteria will need to be adapted: a public-service project may replace the canvas and MVP with a protocol, workflow, or organizational pilot; a regulatory project may require opinions, compliance tests, and participation by additional decision-making bodies. The transferable element is the documented transition logic, not a literal replication of the artifacts in the case.

The model will require greater adaptation when the innovation track plays a peripheral role, when the research does not produce artifacts, when documentation is insufficient for reconstructing decisions, or when irreversible legal and institutional commitments are made before finalizing the analysis. In such scenarios, the gates may incur additional costs without any proportionate benefits, or may arrive too late to supply an early solution.

These limitations also prevent the framework from being presented as a universal answer. The case supports its potential usefulness in contexts in which an observable transition occurs between evidence, requirements, artifacts, and adoption. Beyond this boundary, its contribution should be treated as a hypothesis to be tested rather than a mandatory protocol.

In summary, transferability will depend on the similarity between the observed mechanism — the pressure to convert research into a solution — and the mechanism present in the new context. The greater the institutional, regulatory, technological, or documentary differences, the greater the recalibration required of the transition criteria.

This formulation addresses the study's limitations, but does not detract from its contribution: the model is adaptable and testable, but not universal or self-applicable.

6 CONCLUSIONS

We have shown in this article that integrating applied research and pre-incubation can be productive, provided it is methodologically governed. In the case we analyzed, pre-incubation improved the capacity to translate evidence into requirements, the components of a solution, and communication artifacts, but it also introduced pressures for speed, discursive simplification, and premature stabilization of the scope. The study's central contribution was to demonstrate that this tension can be managed using stage-gates that govern the transitions between diagnosis, translation, prototyping, and preparing to adopt.

From the theoretical viewpoint, we contribute by linking engaged scholarship, Design Thinking, boundary objects, stage-gates, and knowledge mobilization in one coherent model for use in applied research in public administration. Rather than treating the entrepreneurial track as a deviation or as automatic proof of practical relevance, the study reframes it as an environment of expanded translation, whose usefulness depends on explicit safeguards. Methodologically, our contribution lies in making the transition between evidence, interpretation, and artifact auditable. In practical terms, the model provides guidance to researchers and managers who need to operate at the boundary between knowledge production and the development of digital solutions for the public sector.

The study has four main limitations. First, it is a single case study of an EDL contract supervision project and a specific pre-incubation trajectory; any inferences are therefore analytical and depend on comparative validation. Second, the researcher's participation in the entrepreneurial track created a risk of confirmation bias, which was mitigated by reflexivity, triangulation, and treating the artifacts as data to be examined, but not eliminated. Third, the model has not yet been externally validated by other agencies, GovTech domains, or innovation programs. Fourth, the article does not conduct a longitudinal evaluation of the product or estimate the effects on performance, adoption, or the quality of decisions. Its contribution is to governance of the research–solution trajectory, not to the demonstrated effectiveness of the MVP.

Three avenues appear promising for future research. The first is to test the integration model in other applied projects and GovTech domains, by examining whether the same gates remain useful or require recalibration. The second is to compare different pre-incubation and innovation-lab arrangements to assess how different acceleration structures affect the pace of the research. The third is to move toward studies that link the methodological governance layer we proposed here to evaluating implementation and adoption of the artifact in a real-world context.

In summary, when applied research crosses the boundary between innovation and entrepreneurship, the quality of the process depends less on resisting this transition than on governing it. This is precisely the movement that the stage-gate integration model seeks to make visible, replicable, and scientifically defensible.

ACKNOWLEDGMENTS

The authors gratefully acknowledge the support of the Brazilian National Council for Scientific and Technological Development (CNPq), grants 307439/2022-4 and 402695/2025-9.

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CONTEXTUS
CONTEMPORARY JOURNAL OF ECONOMICS AND MANAGEMENT.
ISSN 1678-2089
ISSNe 2178-9258
1. Economics, Administration and Accounting - Journal
2. Federal University of Ceará. Faculty of Economics, Administration, Actuaries and Accounting

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