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Knowledge translation, uncertainty and the emergence of decision infrastructures: insights from the DRIVE-F early-stage spin-off

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Abstract

Purpose – This paper aims to examine how knowledge translation (KT) and risk-related practices enable decision-making in early-stage innovation initiatives characterized by high uncertainty and the absence of stabilized governance structures.

Design/methodology/approach – The study adopts a qualitative, theory-elaborative single-case design based on an in-depth analysis of DRIVE-F, a research-based spin-off developing a multidimensional decision and impact evaluation framework. Empirical material includes design documents, modelling protocols, pilot application materials and internal reflexive records produced during the development process. Data were analysed abductively through a KT framework focusing on translational artefacts, actors, risk-related practices and early decision outcomes.

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Findings – The study shows that KT operates as the process through which a pre-organizational decision infrastructure emerges. Translational artefacts – such as simulations and visual models – function as epistemic scaffolds that render uncertainty discussable. Risk-related practices support alignment and decision readiness by structuring interpretation rather than enforcing control.

Originality/value – The paper reframes KT as a foundational mechanism of organizational emergence and reconceptualizes risk-related practices as translational supports rather than governance instruments. It shifts attention to pre-organizational innovation contexts, contributing to debates on innovation governance under conditions of radical uncertainty.

Keywords Knowledge translation, Uncertainty, Decision infrastructures, Spin-off

Paper type Research paper

1. Introduction

Contemporary organizations increasingly operate in environments characterized by heightened uncertainty, accelerated technological change and growing demands for multidimensional accountability. Innovation processes unfold under conditions where knowledge is fragmented, heterogeneous and often contested, while decisions must be taken in the absence of stable routines, shared interpretive frameworks or consolidated organizational structures (Perminova *et al.*, 2008; Geraldi *et al.*, 2011). Digital transformation and platform-based ecosystems further amplify interdependence and interpretive ambiguity (Nambisan *et al.*, 2017; Yoo *et al.*, 2012), intensifying the challenge of coordinating distributed expertise across loosely coupled actors (Nambisan *et al.*, 2019; Hinings *et al.*, 2018; Spanò *et al.*, 2025). A substantial body of literature has addressed these challenges through risk management and project governance, emphasizing mechanisms for identifying, assessing and mitigating uncertainty in innovation settings (Raz and Michael, 2001; Turner and Müller, 2005; Hillson and Simon, 2020). However, traditional approaches grounded in predictive planning, formal controls and static assessment have been criticized for their limited responsiveness in dynamic, knowledge-intensive environments (Chapman, 1997; Perminova *et al.*, 2008). More adaptive approaches have therefore been proposed, combining formal analytical tools with interpretive and learning-oriented practices (Conforto *et al.*, 2014; Martyn *et al.*, 2016). While this body of work provides important insights, it primarily addresses how uncertainty can be managed once organizational structures and decision frameworks are in place. In contrast, this paper shifts analytical attention to how knowledge becomes actionable before such structures stabilize, placing knowledge translation (KT) at the centre of analysis.

Research in knowledge management and innovation studies has emphasized KT as a mechanism for enabling action under conditions of uncertainty (Carlile, 2004; Savory, 2006; Lemire *et al.*, 2013; Dal Mas *et al.*, 2023). KT moves beyond linear notions of knowledge transfer by foregrounding processes of interpretation, adaptation and recontextualization, through which heterogeneous knowledge becomes intelligible and usable in specific contexts. This perspective aligns with the knowledge-based view of the firm, which locates competitive advantage in the integration and application of dispersed knowledge (Grant, 1996).

Despite growing interest in KT in innovation and entrepreneurship, empirical work remains comparatively sparse on how it operates in pre-organizational initiatives where roles and governance are not yet stabilized (Corbo *et al.*, 2020). In early-stage contexts such as research-based spin-offs and pre-organizational ventures, knowledge is provisional and weakly institutionalized, yet critical strategic and design decisions are taken.

While KT has been widely studied in healthcare and policy domains (Graham *et al.*, 2006; Lemire *et al.*, 2013), and increasingly in interorganizational settings (Carlile, 2004), far fewer studies examine its role in pre-organizational innovation contexts where governance

structures are emergent rather than established. A few studies indicate that KT research has expanded, but remains concentrated in institutionalized settings, while early-stage and entrepreneurial contexts are comparatively under-examined – especially regarding how artefacts and evaluative practices enable translation before governance stabilizes (Wang and Noe, 2010; Foss *et al.*, 2010; Dal Mas *et al.*, 2020).

KT and risk management are often treated as analytically distinct domains. Rather than assuming any intrinsic alignment between them, this study maintains this analytical distinction and examines empirically whether and how risk-related practices may contribute to translation processes in early-stage contexts. Risk management literature has traditionally focused on identification, assessment and mitigation mechanisms (Hopkin, 2018), whereas KT research emphasizes interpretation and boundary spanning (Carlile, 2004).

Recent interpretive perspectives suggest that risk-related practices can also shape attention, categorization and decision frames, functioning as meaning-making devices rather than purely control mechanisms (Power, 2007; Mikes, 2009; Bromiley *et al.*, 2015). Hybrid approaches combining formal tools with dialogue and narratives have been shown to support learning and coordination (Chapman, 1997; Martyn *et al.*, 2016; Spanò *et al.*, 2025). However, whether and how such practices support KT in early-stage, pre-organizational contexts remain an open empirical question.

Early-stage innovation initiatives and research-based spin-offs provide a revealing setting because decisions must be taken while roles, evaluation criteria and governance arrangements are still forming. In these pre-organizational conditions, coordination relies more on artefacts and sensemaking than on formal routines. Thus, adopting a process-oriented perspective, this study asks: *How does knowledge translation operate in early-stage innovation initiatives characterized by high uncertainty and the absence of stabilized governance arrangements?* The paper addresses this question through a single-case analysis of decision, risk and impact value evaluation framework (DRIVE-F), an emergent research-based spin-off initiative. DRIVE-F is a nascent translational artefact developed at the intersection of academic research and entrepreneurial experimentation, aimed at supporting decision-making through multidimensional impact evaluation.

Empirical material includes design artefacts, methodological protocols and pilot applications developed during the formative phase of the spin-off, enabling analysis of the micro-processes through which knowledge becomes intelligible and decision-relevant in pre-organizational settings. Importantly, the paper does not assume that risk-related practices are inherently aligned with KT; instead, their relationship is treated as contingent and empirically examined. The paper contributes by extending KT theory to early-stage contexts, reconceptualizing risk-related practices as epistemic supports for translation and illustrating how translational infrastructures may precede and shape the emergence of organizational forms.

The remainder of the paper is structured as follows. Section 2 reviews the literature, Section 3 presents the analytical framework, Section 4 outlines the research design, Section 5 discusses the findings and Sections 6 and 7 address implications and conclusions.

2. Knowledge translation, uncertainty and risk-related practices in innovation contexts

A growing body of literature argues that the central challenge facing organizations operating in innovation-driven and uncertain environments is not only the generation of new knowledge, but its effective mobilization, interpretation and use in decision-making. In contexts characterized by ambiguity, shifting objectives and heterogeneous knowledge bases, the key issue becomes how knowledge is rendered intelligible and actionable across

actors who do not share common interpretive frames. This challenge is particularly acute in early-stage innovation settings, where evaluative criteria, roles and problem definitions are still evolving.

Within this broader challenge, risk management has often been mobilized as a way of addressing uncertainty. Early approaches primarily emphasized the identification, assessment and mitigation of discrete risks through formalized procedures and standardized tools. While such approaches remain effective in relatively stable environments, they face limitations when uncertainty is endogenous to the innovation process and knowledge is incomplete, provisional or contested (Hillson and Simon, 2020; da Silva Etges and Cortimiglia, 2019). In early-stage innovation contexts, uncertainty often concerns undefined problem spaces and shifting evaluative criteria, making ex ante specification impracticable. As innovation unfolds within complex socio-technical systems, risk profiles evolve dynamically and resist exhaustive specification (Muntés-Mulero *et al.*, 2019).

In response to these limitations, the literature has progressively shifted toward more adaptive and hybrid risk-related practices. Configurations combining predictive planning with iterative, learning-oriented approaches have been proposed to balance control and exploration (Chapman, 1997; Conforto *et al.*, 2014; Martyn *et al.*, 2016). These perspectives emphasize that risk management is not merely a technical activity but also a cognitive and social process that shapes how uncertainty is framed, communicated and acted upon (Mikes, 2009; Spanò and Zagaria, 2022; Hopkin, 2018). However, while the operational benefits of such approaches are increasingly acknowledged, their role in shaping underlying knowledge processes remains insufficiently theorized.

In particular, limited attention has been devoted to how risk-related practices may intersect with processes of KT across disciplinary, professional and organizational boundaries (cf. Dal Mas *et al.*, 2023; Spanò *et al.*, 2025). In innovation contexts characterized by high uncertainty, such practices may, under specific conditions, contribute to structuring how knowledge is framed, categorized and made actionable. Importantly, this study does not assume that risk-related practices are inherently aligned with KT; rather, their relationship is treated as contingent and subject to empirical investigation.

The concept of KT provides a productive lens to address this limitation. KT shifts attention away from linear notions of knowledge transfer and toward the situated processes through which knowledge is reinterpreted, adapted and rendered meaningful for specific actors and contexts (Carlile, 2004; Savory, 2006). Rather than presuming shared understanding, KT highlights the transformation required to align diverse cognitive frames, evaluative criteria and professional languages (Milagres and Burcharth, 2019).

Within organizational and innovation studies, KT is closely connected to the knowledge-based view of the firm, which locates competitive advantage in the integration and application of dispersed knowledge (Grant, 1996). From this perspective, KT underpins absorptive capacity, defined as the ability to recognize, assimilate and apply external knowledge (Cohen and Levinthal, 1990). More broadly, the knowledge-based view suggests that firms exist because they provide superior mechanisms for integrating specialized knowledge (Kogut and Zander, 1992; Grant, 1996; Foss and Pedersen, 2016; Castellani *et al.*, 2022). Integration becomes particularly demanding under conditions of uncertainty and epistemic distance, where shared codes, routines and interpretive frames are absent. In such contexts, KT is not merely a supportive process but a constitutive mechanism through which coordination becomes possible.

Importantly, KT is neither neutral nor purely technical. It is shaped by power relations, interpretive frames and the material artefacts through which knowledge is expressed and negotiated (Carlile, 2004). In innovation settings, translation frequently relies on boundary

objects, such as models, plans or scenarios, that enable coordination among actors with heterogeneous expertise without requiring full consensus (Weick *et al.*, 2005).

Recent studies have begun to explore KT within entrepreneurial and innovation ecosystems. Dal Mas *et al.* (2023), for instance, demonstrate how business plans function as translational artefacts integrating strategic, financial and operational knowledge across actors with divergent backgrounds. Their findings underscore the iterative and evolving nature of KT, sustained through interaction and artefact adaptation.

At the same time, research on systemic and socio-technical innovation emphasizes that innovation emerges from interactions among multiple actors embedded in broader systems, rather than within isolated organizations (Geels, 2004; Meadows, 2008). From this perspective, uncertainty and knowledge fragmentation are not anomalies but structural features of innovation processes, reinforcing the importance of mechanisms that can support translation, sensemaking and collective learning.

Despite these advances, two important gaps remain. First, most existing studies focus on established organizations or well-defined projects with stabilized roles and governance arrangements, paying limited attention to early-stage initiatives such as research-based spin-offs, where organizational structures and decision criteria are still emerging (Nambisan *et al.*, 2019). Second, although hybrid risk-related practices are increasingly recognized as enabling learning and adaptation, their role in supporting KT in such pre-organizational contexts remains underdeveloped. Addressing these gaps requires shifting analytical attention to phases in which governance is not yet institutionalized and examining how translation processes unfold under these conditions.

Addressing these gaps requires shifting analytical attention upstream, to phases in which governance is not yet institutionalized, and decision-making depends on provisional models, simulations and narratives. In such settings, KT may function as a pre-organizational infrastructure, enabling coordination and sensemaking before formal structures consolidate.

By examining an early-stage decision and impact evaluation framework developed within a nascent spin-off, this study contributes by showing how KT is enacted through artefacts and interactional processes under conditions of uncertainty. It further examines whether and how risk-related practices may contribute to these processes, without presuming such a role in advance. In doing so, the study extends research on KT, hybrid risk-related practices and systemic innovation by illuminating how knowledge becomes actionable at the early stages of organizational formation.

3. Knowledge translation under uncertainty: a theoretical reframing for early-stage innovation

Innovation processes are increasingly shaped by epistemic plurality, systemic uncertainty and temporal misalignments between knowledge production and decision-making. Digital transformation and platform-based innovation ecosystems further amplify these conditions by increasing interdependence, generativity and coordination challenges across heterogeneous actors and infrastructures (Hinings *et al.*, 2018; Nambisan *et al.*, 2019). In such contexts, the central challenge is no longer the generation of new knowledge, but its translation into forms that are intelligible, actionable and legitimate for actors operating with incomplete information and evolving objectives.

The concept of KT has gained prominence precisely because it captures this challenge more effectively than traditional notions of knowledge transfer or diffusion. While early organizational research focused on moving information across units or boundaries, subsequent work has demonstrated that knowledge rarely travels unchanged across contexts (Carlile, 2004; Savory, 2006). Instead, it must be interpreted, reframed and adapted to fit the

cognitive frames, practices and constraints of different actors (Knight and Trowler, 2001; Lemire *et al.*, 2013).

KT is therefore not a linear or technical activity, but a situated and iterative process through which meaning is co-produced. This view aligns with the knowledge-based view of the firm, which locates competitive advantage in the integration and application of dispersed knowledge rather than in its mere possession (Grant, 1996). Such integration is particularly critical under conditions of epistemic distance and uncertainty, where shared interpretative frames are absent (Nonaka *et al.*, 1996; Nonaka and von Krogh, 2009).

These challenges are amplified in innovation contexts characterized by high uncertainty, where decision-making unfolds without stable routines, clear performance metrics or consolidated governance structures. Research in innovation and project management highlights that uncertainty is not only technical but also cognitive and institutional, shaping how problems are framed and how solutions are evaluated (Perminova *et al.*, 2008; Geraldi *et al.*, 2011). Under these conditions, actors must continually reassess assumptions, priorities and courses of action.

In such settings, KT performs a foundational sensemaking function (Weick *et al.*, 2005). It enables actors to render fragmented and heterogeneous knowledge commensurable, supporting provisional alignment and coordinated action. This role has been observed in interdisciplinary research collaborations (Miller *et al.*, 2008), entrepreneurial ecosystems (Dal Mas *et al.*, 2023) and innovation networks spanning organizational and professional boundaries (Dyer and Singh, 1998).

A consistent insight across these studies is that KT is inseparable from the artefacts through which knowledge is articulated. Business plans, dashboards, models and narratives are not neutral containers of information; they actively shape what counts as relevant knowledge and how uncertainty is interpreted (Karlsson and Honig, 2009; Shane and Delmar, 2004). Functioning as boundary objects, such artefacts enable coordination without requiring full consensus (Carlile, 2004). In digitally mediated innovation settings, these artefacts increasingly operate as "interfaces" that stabilize provisional assumptions while remaining open to iterative revision (Appio *et al.*, 2021).

Recent research further suggests that KT may, under certain conditions, be supported by practices traditionally associated with risk management, when these are enacted in adaptive and hybrid forms. Classical risk management approaches based on prediction and control have been widely criticized for their limited relevance in innovation-driven environments (Raz and Michael, 2001; Hillson and Simon, 2020). In contrast, more flexible approaches emphasize learning, dialogue and continuous reassessment, thereby supporting interpretation rather than constraining it (Chapman, 1997; Martyn *et al.*, 2016).

From this perspective, risk-related practices can be understood as epistemic devices that structure attention, surface assumptions and stimulate reflection (Mikes, 2009). Tools such as scenario planning, iterative reviews and early-warning indicators do not merely aim to reduce risk exposure; they can also create spaces for KT by enabling actors to explore alternative futures and negotiate uncertainty.

However, much of the existing literature assumes established organizational settings in which KT unfolds against a backdrop of stabilized roles, routines and governance arrangements. Far less attention has been paid to early-stage innovation initiatives and research-based spin-offs, where such structures are still emerging or entirely absent. In these contexts, KT cannot rely on institutionalized channels or authority-based coordination but operates as a process through which provisional alignment and decision readiness are constructed. This study conceptualizes this condition as pre-governance, defined as a phase

in which formal authority, roles and control mechanisms are not yet stabilized, and coordination depends on artefacts (Tõnurist and Hanson, 2020).

This paper builds on and extends the KT literature by explicitly focusing on this pre-governance phase and by conceptualizing KT as the process through which a decision infrastructure emerges. Rather than treating infrastructure as pre-existing, the study examines how it is progressively assembled through artefacts, interaction and interpretation. In this sense, KT is understood as a generative process that enables the emergence of minimal coordination conditions required for decision-making under uncertainty (Cooper, 2019).

The framework adopted in this study conceptualizes KT along five interrelated dimensions:

(1) the characteristics of the knowledge involved;

(2) the translation mechanisms through which knowledge is rendered actionable;

(3) the actors participating in translation processes;

(4) the role of risk-related practices as potential supports for interpretation and learning; and

(5) the early outcomes of translation in terms of shared understanding and decision readiness.

These dimensions are treated as co-evolving elements within an emergent process rather than as stable or sequential stages. Within this framework, translational artefacts are understood as material and visual devices through which knowledge is articulated and negotiated, while decision infrastructure refers to the emergent assemblage of artefacts, practices and interpretive frames that enables decision readiness. For clarity, key concepts are used consistently throughout the paper as follows. An early-stage context refers to empirical conditions in which roles, evaluation criteria and organizational structures are not yet stabilized. Pre-governance denotes the analytical condition in which formal authority and control mechanisms are absent. KT is treated as the central process through which knowledge is rendered actionable. Decision infrastructure refers to the emergent configuration of artefacts, practices and interpretive frames that enables decision-making. Translational artefacts are the material and visual devices through which KT is enacted.

4. Materials and methods

4.1 Research design and case selection

This study adopts a qualitative case research design aimed at deepening understanding of KT processes in early-stage innovation settings, where organizational forms, governance arrangements and market positioning are still emerging. The methodological choices are explicitly aligned with the paper's theoretical objective: to examine how KT operates in early-stage contexts and how translation processes contribute to the emergence of decision infrastructures under conditions of uncertainty.

The study adopts a single case design (Yin, 2018), selected for its capacity to make visible processes that are typically difficult to observe in more stabilized organizational settings.

From an epistemological standpoint, the study is grounded in an interpretive and constructivist perspective, which views knowledge not as an objective entity to be transferred, but as something continuously constructed, negotiated and recontextualized through interaction, artefacts and practice (Weick *et al.*, 2005; Carlile, 2004). This orientation is consistent with prior KT research emphasizing sensemaking, boundary spanning and meaning negotiation across heterogeneous actors and knowledge domains (Lemire *et al.*, 2013; Milagres and Burcharth, 2019).

The research strategy follows a theory-informed qualitative case approach (Ahrens and Chapman, 2006), aimed at analytical rather than statistical generalization (Eisenhardt and Graebner, 2007). The objective is therefore not to generalize statistically, but to refine and elaborate theoretical constructs through in-depth process tracing. In line with established case research principles (Yin, 2018), the case was selected for its revelatory potential: DRIVE-F represents an early-stage, research-based spin-off in which decision infrastructures and organizational arrangements are co-emerging. This makes it particularly suitable for observing KT processes in a pre-governance phase, before roles, routines and evaluation criteria stabilize.

4.2 Empirical setting

Empirically, the paper focuses on DRIVE-F, a research-based spin-off initiative at an early stage of development, conceived to support decision-making under uncertainty through the evaluation and simulation of multidimensional impacts (economic, social, environmental and cultural). At the time of analysis, DRIVE-F did not constitute a stabilized organization nor a fully commercialized product. Rather, it existed as an emergent configuration of models, analytical tools, methodological protocols and translational artefacts developed within an academic–entrepreneurial context.

Central to the initiative is the approach for risk target evaluation and mitigation in success impact assessment (A.R.T.E.M.I.S.I.A.) artefact, a modular analytical framework integrating probabilistic modelling, multidimensional indicators and scenario-based simulations. In this study, the unit of analysis is not the organization as a formal entity, but the KT processes enacted through the development and use of this artefact and related practices.

4.3 Data collection and sources of evidence

Data were collected from multiple qualitative sources generated during the formative phase of the initiative (2024–2025), with the aim of capturing both the evolution of translational artefacts and the interactional processes through which knowledge was interpreted and negotiated. The use of heterogeneous sources enables triangulation and strengthens construct validity (Dyer and Singh, 1998; Yin, 2018). The data corpus includes:

- 31 conceptual and methodological design documents describing the logic, architecture and intended use of the DRIVE-F framework;
- 3 technical notes and modelling protocols related to the development of the A.R.T.E.M.I.S.I.A. artefact;
- 4 pilot applications and exploratory testing with prospective users;
- more than 50 internal discussions, 16 workshops and presentations; and
- weekly reflexive memos produced by the research team during model development.

These sources were used for distinct analytical purposes. Conceptual and methodological design documents ($n = 31$) and modelling protocols ($n = 3$) were primarily used to trace the evolution of the artefact and its underlying assumptions over time. Pilot applications ($n = 4$) provided insight into how the artefact was engaged and interpreted by prospective users. Workshops and presentations ($n = 16$), together with internal discussions, were used to reconstruct interactional episodes through which knowledge was translated across actors. Reflexive memos supported the interpretation of ongoing translation dynamics and documented shifts in assumptions, modelling choices and evaluative criteria. Informal interviews and interactional episodes were used as contextual sources to clarify how participants interpreted and engaged with the artefact. These were not treated as independent

data sources, but as supporting materials for reconstructing translation processes. All documents were archived digitally and organized chronologically to enable temporal tracking of conceptual shifts and design iterations. Analytical attention was focused on translation dynamics and decision processes. Artefacts were treated as process data, allowing reconstruction of how knowledge was progressively rendered actionable through successive iterations. This approach enabled systematic tracing of how specific empirical episodes and artefact modifications informed the patterns reported in the findings.

4.4 Data analysis

The analytical process was iterative and abductive, moving back and forth between empirical material and theory (Dubois and Gadde, 2002). Rather than testing predefined hypotheses, the study sought to refine and elaborate KT theory through systematic engagement with the empirical case. Analysis proceeded in three stages. First, open coding was conducted to identify episodes of translation, artefact use, uncertainty framing and interaction across knowledge domains. Particular attention was paid to linking these episodes to specific data sources (e.g. design documents, workshops, pilot applications) to preserve evidentiary traceability. Coding was performed manually and iteratively to assure contextual meaning.

Second, axial coding grouped these empirically identified episodes according to the five analytical dimensions derived from the theoretical framework: the characteristics of the knowledge involved; the translation mechanisms through which knowledge was rendered actionable; the actors participating in translation processes; the role of risk-related practices as supports for interpretation and learning; the early outcomes of translation in terms of shared understanding and decision readiness. These dimensions were used as sensitizing concepts and were iteratively refined through comparison with the underlying data (Carlile, 2004; Dal Mas *et al.*, 2023; Mikes, 2009). They were iteratively refined through continuous interaction between empirical observations and theoretical sensitizing concepts. Throughout this stage, empirical claims were systematically cross-checked against multiple data sources to ensure that interpretations were grounded in recurring patterns rather than single observations.

Third, pattern refinement and constant comparison were conducted to identify recurring mechanisms and tensions across sources. Disconfirming evidence and ambiguities were explicitly retained and examined to avoid premature closure, consistent with interpretive case research standards (Ahrens and Chapman, 2006; Yin, 2018). Importantly, these dimensions were treated not as static variables but as dynamic and mutually constitutive processes, consistent with a processual view of KT (Nonaka and von Krogh, 2009; Weick *et al.*, 2005).

Several strategies were used to enhance analytical rigor. First, data triangulation across heterogeneous sources ensured that key interpretations were supported by multiple forms of evidence (Dyer and Singh, 1998; Yin, 2018). Second, temporal bracketing allowed analysis of how translation processes and artefact configurations evolved over time. Third, theoretical triangulation was conducted by systematically comparing emerging interpretations with the literature mobilized in the theoretical framework. Finally, reflexive memoing documented analytical decisions and potential researcher biases, strengthening transparency and consistency throughout the analytical process. This methodological approach enables the paper to link empirical episodes, interactional processes and artefact evolution directly to the theoretical claims advanced in the findings, thereby strengthening the evidentiary grounding of the case-based argument.

5. Findings: knowledge translation as an emergent infrastructure in the formative phase of DRIVE-F

The findings draw on qualitative analysis of multiple data sources, including design documents, modelling protocols, pilot applications, workshops and presentations, internal

discussions and reflexive memos. Rather than treating DRIVE-F as a stabilized organizational entity, the analysis examines it as an emergent configuration of artefacts, practices and interactions through which a decision infrastructure progressively takes shape.

The analysis shows that KT operates as the central process through which this infrastructure emerges. Risk-related practices are observed within this process, but their role is not assumed in advance; instead, they are examined in terms of how they contribute, in this specific case, to structuring interpretation and discussion under conditions of uncertainty.

DRIVE-F operates at the intersection of KT, uncertainty-oriented decision support and multidimensional impact evaluation. Its central artefact, A.R.T.E.M.I.S.I.A., does not function merely as a technical model but as a translational infrastructure through which heterogeneous knowledge domains are articulated and negotiated.

Across the empirical material, KT emerges not as a supporting function but as a foundational process that precedes governance, routines and formal control systems.

Across the empirical material, this foundational role of KT becomes visible in three overlapping phases of the initiative:

(1) initial problem framing, where disciplinary assumptions collide;

(2) artefact prototyping, where translation mechanisms are experimented with; and

(3) pilot interaction, where provisional coherence is tested and renegotiated.

Rather than unfolding linearly, these phases overlap and feed into each other, progressively stabilizing shared interpretive frames. The findings are organized along the five analytical dimensions introduced earlier. Each subsection explicitly illustrates one dimension of the analytical framework, thereby linking empirical evidence to the theoretical reframing advanced earlier.

5.1 The nature of knowledge: fragmentation, heterogeneity and epistemic asymmetry

A first central finding concerns the character of the knowledge mobilized within the initiative. Across design documents, pilot sessions and modelling protocols, knowledge appears fragmented, heterogeneous and unevenly distributed. The knowledge base spans quantitative metrics, qualitative judgments, regulatory and normative frameworks, tacit professional insights from different disciplinary backgrounds. These forms of knowledge are not only different in content; they are different in epistemic status. Some are expressed as statistically bounded probabilities, others as narrative expectations or institutional constraints. For example, in one modelling session, a discussion emerged around whether social impact indicators should be weighted equally to financial projections.

This illustrates a recurring empirical pattern observed across workshops and modelling sessions: the primary challenge is not the absence of data, but the misalignment of interpretive frames. The findings reflect the first analytical dimension of the framework: the heterogeneous epistemic status of the knowledge involved. The initiative therefore confronts the challenge of constructing provisional coherence across heterogeneous evaluative logics before any governance mechanism exists to enforce alignment.

5.2 Translation mechanisms: artefacts as epistemic scaffolding rather than decision tools

Dashboards, impact maps, probabilistic simulations and visual modelling interfaces do not operate as finalized decision-support tools. Instead, they function as epistemic scaffolds.

For instance, simulations are not used to produce definitive forecasts. During workshops, participants often focus less on expected values and more on the shape of uncertainty and the plausibility of extreme scenarios.

As one team member explained:

> The value is not the number itself. The value is that people start asking why the curve looks like that, what assumption is driving it. The model becomes a conversation starter.

Early iterations of the dashboard deliberately avoid fixed thresholds or automatic rankings. This prevents premature closure and keeps the artefact dialogical rather than prescriptive.

In several pilot interactions, participants proposed modifications to indicators, weighting logics and visualization formats. These proposals were not treated as external feedback to be "implemented later." They became part of the ongoing redesign process. Over successive iterations, the artefact visibly changed. Early versions (initial design documents, early 2024) displayed single-point estimates; later versions (pilot phase, 2025) incorporated confidence bands and scenario sliders that allowed users to manipulate key assumptions in real time. These design modifications were not merely technical refinements but reflected shifts in how uncertainty was collectively framed and discussed. Thus, across these iterations, artefacts operate as mediating devices that surface implicit assumptions and structure interaction.

They enact the second analytical dimension: translation mechanisms that scaffold interpretation under uncertainty.

5.3 Actors and roles: translation without stable role differentiation

A third major finding, observed across workshops and pilot interactions, concerns the fluidity of actor roles. In DRIVE-F's formative phase, there is no clear separation between knowledge producers, translators and users. Founders, technical collaborators and prospective users jointly engage in problem framing and model interpretation.

During early pilot sessions, participants shift roles dynamically. A statistician may explain model assumptions, then question their practical relevance; a prospective user may challenge technical details while simultaneously suggesting alternative evaluative criteria.

One participant described this ambiguity:

> "Sometimes we didn't know whether we were supposed to explain the model, defend it or change it on the spot. But that ambiguity forced us to really listen."

This fluidity produces productive tension. Translation therefore becomes a collective accomplishment rather than the task of a designated intermediary.

At the same time, the absence of stable role differentiation introduces uncertainty regarding accountability and decision authority. Translation enabled dialogue, but it did not fully resolve questions of authority. This suggests that while KT can precede governance, it also generates pressures for its eventual formalization.

Thus, translation serves as a provisional coordination mechanism in a structurally fluid environment, while simultaneously generating pressures for the eventual stabilization of roles and authority.

5.4 Risk-related practices as cognitive and translational supports

Across modelling protocols and workshop interactions, sensitivity analyses, early warning indicators and risk-impact matrices are present. However, they are not deployed as compliance or monitoring tools. Instead, they function as cognitive supports.

In workshop settings, when an indicator shifts from green to yellow, the discussion rarely turns to sanction or corrective action. Instead, it triggers interpretive inquiry:

> "When something turns yellow, the first reaction is not panic. It's curiosity: what is this telling us? Is it the data, the assumption or the context that is changing?"

This illustrates how risk-related elements stabilize dialogue rather than behaviour. They make uncertainty visible, provide a shared vocabulary, encourage reflection on assumptions and legitimize discussion of potential failure without blame. Importantly, these practices are introduced before formal governance structures exist. They enable structured conversations about uncertainty without requiring predefined accountability mechanisms.

In this case, risk-related practices contribute to KT by translating abstract uncertainty into structured but negotiable representations. Their role is not to enforce control or reduce uncertainty directly, but to support interpretive processes through which uncertainty becomes discussable and actionable. These practices stabilize dialogue and provide a shared vocabulary without presupposing formal governance structures, thereby supporting translation processes under pre-governance conditions.

5.5 Early translation outcomes: sensemaking, alignment and decision readiness

The final dimension concerns the observable outcomes of KT, as identified across pilot applications, workshops and reflexive records. These outcomes are cognitive and relational conditions that enable further action.

Three recurring outcomes emerge consistently across data sources. First, we can highlight an enhanced collective sensemaking. Second, the analysis shows provisional alignment, as full consensus is not achieved but shared reference points emerge. Third, decision readiness emerges from actors feeling more prepared to act, even in the absence of complete information.

As one potential user stated:

> "I wouldn't say the tool gives me the answer. But it helps me understand what kind of decision I am making and what I am accepting."

This is a crucial finding. Translation does not produce certainty. It produces structured awareness.

These outcomes correspond to the fifth analytical dimension: early translation results in terms of shared understanding and decision readiness.

In practical terms, this readiness translated into concrete actions.

The findings demonstrate that, in early-stage innovation settings, KT does not merely connect existing organizational components but progressively assembles them. By stabilizing dialogue before stabilizing structure, KT creates the minimal decision infrastructure required for organizational emergence under uncertainty.

6. Discussion

This study set out to explore how KT operates under conditions of radical uncertainty. By examining the formative phase of DRIVE-F, the findings provide evidence that challenges a common assumption that runs across much of the KT, risk and innovation literature: that translation presupposes stabilized organizational structures, defined roles and consolidated governance arrangements. Instead, the evidence from this case shows that KT can precede and actively shape organizational emergence.

A first theoretical implication concerns the temporal positioning of KT. Foundational models of KT often assume that knowledge has already been produced and that recipient organizations possess sufficient absorptive capacity to integrate it (Graham *et al.*, 2006; Lemire *et al.*, 2013). Even practice-oriented accounts conceptualize translation as a bridging activity between relatively stable domains such as research and practice (Carlile, 2004). The findings presented here suggest a need to reconsider this sequence. In DRIVE-F, translation does not occur between pre-existing and bounded domains. Rather, it

unfolds in a context where boundaries, roles and decision criteria are themselves still under construction. Translational artefacts such as simulations, dashboards and scenario sliders do not simply connect domains; they participate in defining what those domains are and how they relate. KT operates, in this case, as the process through which a pre-organizational infrastructure emerges. It enables actors to articulate decision problems, surface trade-offs and explore uncertainty before governance crystallizes. This finding contributes to interpretive perspectives on organizing and sensemaking (Weick *et al.*, 2005) by showing that translation does not merely reduce equivocality; it makes ambiguity workable. It stabilizes dialogue before stabilizing structure. This temporal reframing aligns with recent calls to examine anticipatory and pre-governance innovation dynamics (Tõnurist and Hanson, 2020) and complements digital innovation research emphasizing that coordination precedes formal institutionalization in platform and ecosystem settings (Nambisan *et al.*, 2019; Hinings *et al.*, 2018).

A second contribution concerns the nature of knowledge involved in early-stage translation. The findings confirm that innovation mobilizes heterogeneous forms of knowledge, consistent with the knowledge-based view (Grant, 1996) and research on tacit knowledge (Nonaka *et al.*, 1996; Nonaka and von Krogh, 2009). However, the case suggests that the tacit/explicit distinction only partially captures the dynamics observed. In DRIVE-F, much of the knowledge addressed is neither fully tacit nor fully explicit; it is unsettled. Its meaning, relevance and validity depend on future contingencies that remain uncertain. For instance, the debate around the commensurability of social and financial indicators was not about codification, but about the legitimacy of weighting heterogeneous values. This suggests a possible conceptual refinement: in early-stage contexts, a useful analytical distinction may be between stabilized and provisional knowledge. Translation does not simply convert tacit knowledge into explicit representations. It temporarily stabilizes provisional claims without resolving their contingency. Artefacts therefore function not as repositories of truth, but as epistemic scaffolds.

A third and particularly salient contribution concerns the relationship between KT and risk-related practices. Risk management is frequently framed either as a technical control system (Hillson and Simon, 2020; Hopkin, 2018) or as a hybrid arrangement combining formal tools with interpretive elements (Chapman, 1997; Martyn *et al.*, 2016; Spanò and Zagaria, 2022). The present study shows that, in this case, risk-related practices operate as part of ongoing KT processes, contributing to how uncertainty is interpreted and discussed. Sensitivity analyses, probabilistic distributions and early warning indicators do not enforce accountability or discipline behaviour. In this case, these practices contribute to structuring attention, legitimizing discussion of uncertainty, enabling comparison of alternative futures and supporting reflection on underlying assumptions. Importantly, this relationship is not treated as intrinsic or generalizable. The findings do not suggest that risk-related practices inherently support KT, but rather that they may do so under specific conditions, particularly in early-stage contexts characterized by pre-governance.

This contributes to clarifying that the relationship between KT and risk-related practices is not self-evident, but must be examined empirically. The findings also suggest a reversal of the commonly assumed sequence between governance and translation. The DRIVE-F case suggests that translational practices can contribute to generating provisional orderings of knowledge and uncertainty that later crystallize into governance arrangements. At the same time, the findings show that prolonged role fluidity eventually produces pressure for formalization, particularly when decisions about resources or positioning are delayed.

Thus, the contribution is not anti-governance. Rather, it concerns sequencing. Premature stabilization risks constraining inquiry; delayed stabilization risks paralysis. Translation

temporarily holds these tensions together. The study further contributes to debates on actors and agency in KT. Prior work emphasizes boundary spanners and intermediaries (Dyer and Singh, 1998; Dal Mas *et al.*, 2023). In the early-stage context examined here, however, translation appears less role-bound and more distributed across artefacts, interactions and evolving configurations. In the absence of stable authority structures, artefacts themselves become coordination devices.

From a broader theoretical perspective, the findings position KT as a micro-foundational mechanism of systemic innovation. This study contributes by showing how KT operates at the micro-level of modelling sessions, scenario discussions and artefact redesign, where epistemic alignment is assembled incrementally under uncertainty.

Taken together, the discussion advances KT theory in four ways:

(1) Temporal reframing: KT can precede and shape organizational stabilization.

(2) Epistemic refinement: provisional vs stabilized knowledge is a more productive distinction than tacit vs explicit in early-stage contexts.

(3) Risk reconceptualization: risk-related practices may function as translational supports rather than control systems.

(4) Organizational emergence: translation contributes to assembling minimal coherence required for organizational formation.

By grounding these claims in detailed micro-process evidence from the case, the study responds to calls for more processual and empirically grounded perspectives on knowledge and innovation.

7. Conclusions

This study addressed a central yet insufficiently explored question in the literature on KT, innovation and decision-making: how knowledge becomes actionable in early-stage initiatives characterized by radical uncertainty. By placing KT explicitly at the centre of analysis, the study shifts attention from control-oriented approaches toward the interpretive processes through which heterogeneous knowledge is rendered intelligible and usable before governance structures stabilize.

While prior research has demonstrated the importance of KT in innovation processes, much of this work assumes the presence of established organizations, defined roles and institutionalized decision frameworks. This study instead focuses on the formative phase in which knowledge remains provisional and organizational structures are still emerging.

By examining the early development of the DRIVE-F initiative, the study shifts analytical attention to a phase in which translation precedes organizational stabilization. The findings suggest that KT does not merely facilitate decision-making within existing structures; rather, it operates as the process through which a minimal decision infrastructure progressively emerges. Translation mechanisms and artefacts contribute to structuring how actors negotiate meaning, articulate trade-offs and engage with uncertainty under pre-governance conditions.

The study contributes to the literature in three main ways. First, it suggests a temporal reframing of KT by showing that translation processes can precede and shape organizational stabilization, rather than operating only within established structures. Second, it highlights the role of translational artefacts as epistemic scaffolds that support interpretation and coordination under conditions of uncertainty. Third, it examines the role of risk-related practices within these processes, showing that they may, under specific conditions, contribute to structuring how uncertainty is interpreted and discussed.

Importantly, the study does not assume any intrinsic alignment between KT and risk-related practices. Rather, their relationship is treated as contingent and empirically grounded. The findings show that, in this case, risk-related practices contribute to translation processes by supporting interpretation and dialogue, rather than by enforcing control or reducing uncertainty directly.

These contributions invite a reconsideration of the relationship between translation and governance. Rather than viewing governance as a precondition for effective KT, the findings indicate that translational practices may generate provisional orderings that later crystallize into governance arrangements. At the same time, prolonged reliance on fluid translation without stabilization may generate tensions and pressures for formalization. The contribution therefore concerns sequencing rather than opposition: translation and governance are temporally intertwined but not hierarchically ordered. This perspective speaks directly to contemporary debates on adaptive and experimental innovation governance, where the challenge lies in balancing accountability with exploratory capacity.

From a practical standpoint, the findings suggest that entrepreneurs and founders of research-based spin-offs should consider early investment in translational artefacts, not as ancillary technical tools, but as strategic infrastructures. Such artefacts enable sensemaking, stakeholder alignment and decision readiness under uncertainty. They support legitimacy-building and opportunity exploration before performance metrics and formal control systems can be meaningfully established. However, the study also cautions that translational capacity complements rather than replaces eventual institutional stabilization.

The policy implications are equally significant. The evidence presented here suggests that prematurely imposing governance logics may constrain the exploratory and translational work required for early-stage initiatives to cohere. Public funding schemes might therefore benefit from recognizing translational capacity as a foundational capability. This could involve supporting the development of shared interpretive frameworks, exploratory decision infrastructures and learning-oriented practices and aligning accountability mechanisms with the temporal maturation of initiatives rather than with predefined milestones alone. In this sense, policy support for innovation may need to move from emphasizing immediate performance metrics to enabling epistemic coordination under uncertainty.

The study has several limitations. It is based on a single in-depth case, which enables theoretical elaboration but limits empirical generalization. However, the revelatory character of the case allows close observation of translational dynamics that are typically less visible in stabilized organizational settings. Comparative and multi-case research across sectors and institutional environments would help assess the broader applicability of the identified dynamics. Moreover, the analysis focuses on a formative phase; longitudinal research is needed to examine how early translational infrastructures evolve as governance structures solidify and market pressures intensify. Future research could also explore the potential downsides of early-stage KT. Translation may privilege certain problem framings over others, obscure power asymmetries or inadvertently narrow strategic imagination. Investigating how translational practices interact with issues of authority, inclusion and contestation would deepen the critical understanding of KT in innovation contexts. In addition, further work could examine how translational artefacts travel across organizational and institutional boundaries and how their meanings shift as initiatives move from exploration to exploitation.

In conclusion, this study argues that early-stage innovation cannot be fully understood without foregrounding KT as a primary analytical lens. By showing how translation assembles provisional coherence, enables decision readiness and structures engagement with uncertainty prior to organizational stabilization, the analysis repositions KT as a foundational

mechanism of innovation under incompleteness. Recognizing translation as a pre-governance infrastructure not only advances theoretical debates but also informs how practitioners and policymakers design and support innovation trajectories in uncertain environments. More broadly, the study suggests that understanding innovation under uncertainty requires shifting attention from control and prediction toward the processes through which knowledge is translated into actionable forms.

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