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GOVERNANCE IN IMPLEMENTING WEAKLY STRUCTURED INFORMATION SYSTEMS

Research Paper

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Abstract

The implementation of information systems (IS) is a complex process that requires appropriate governance to ensure that the technical capabilities of the new IS align with organizational goals. However, existing literature lacks insight into how this alignment occurs when IS are designed as open-ended, weakly structured systems that offer generic functions, rather than for a singular purpose. To address this gap, this study examines the implementation of a low-code AI platform in eight large companies and the governance practices they employed to align the system's capabilities with their organizational goals. The findings highlight the importance of balanced governance practices that support and constrain the generative capacity of weakly structured IS, while enabling continuous interdependent development of organizational and technical capabilities throughout implementation. This study contributes to IS literature by responding to calls to examine challenges of implementing weakly structured IS and offering practical recommendations for implementation teams and system vendors.

Keywords: IS implementation, governance, weakly structured IS, low-code AI platform, case study.

1 Introduction

The implementation of new information systems is a complex process. It often starts with initial discussions and ends with infusion of the system within the organization, while relying on varied governance efforts to guide collective action for the organizational and technical changes during the implementation process (Cooper and Zmud, 1990; Mueller-Bloch et al., 2022). A key objective in IS implementation is to align the new IT capabilities with the organizational environment (Arvidsson et al., 2014; Chan et al., 1997; Leonard-Barton, 1988).

Achieving such alignment is relatively straight-forward with IS designed for a singular purpose, for instance manufacturing control systems designed to improve operational efficiency (Avital and Te'eni, 2009). However, IS are increasingly designed as "weakly structured", in which "use is not defined initially by organizational rules embedded in the IT" (Eley and Lyytinen, 2022, p. 5113). Such systems are designed to be open-ended and provide generic functions to search, store and combine digital objects. Thus, they offer a variety of potential applications, and understanding what application is the most useful for an organization often only emerges during the implementation process (Lyytinen et al., forthc.). Examples of weakly structured IS include 3D-CAD software (Boland et al., 2007), e-learning systems (Lyytinen et al., forthc.) or low-code development platforms (Iho, 2021). With the latter for instance, users are typically able to select and combine pre-programmed components in a visual interface to create a wide variety of functional software applications (Bock and Frank, 2021).

Prior literature has predominantly focused on the positive implications of using weakly structured IS, such as their malleable design of loosely coupled components that allow a wide range of potentially useful configurations and can foster serendipitous innovations (Nylen & Holmström, 2019). For instance, Boland et al. (2007) illustrate how using a 3D-CAD software in a joint construction project led to 'wakes of innovation', where different project members utilized the software in different ways to adapt their own development processes. We suggest that this perspective may be too simplistic, as it neglects the potential challenges during implementation in aligning a technical system that provides a myriad of potential configurations with organizational goals (Lehmann et al., 2022).

Despite a plethora of IS implementation studies, few address this malleability and related implementation challenges. To address this research gap, and following previous calls for empirical studies that compare outcomes of IS implementation across organizations (Kohli and Melville, 2019), we explore the following research question: *what governance practices do organizations enact during the implementation of weakly structured information systems? And how do such practices facilitate the alignment between technological capabilities and organizational goals?* To answer the research question, we draw on the concept of generative governance (Thomas & Tee, 2022) because it facilitates a more granular look on how governance can both support and constrain generative processes during IS implementation**.** We conducted a qualitative case study on the implementation of one weakly structured IS "Comvers.ai" across eight large companies from diverse industries. Comvers.ai is a low-code artificial intelligence (AI) platform designed for users with little technical expertise to incorporate language-based AI applications in their business processes. Comvers.ai's hybrid architecture, which incorporates both rule-based and AI models, and its user-friendly interface design have received industry recognition and design awards, suggesting that the platform could be easily customized by companies to meet their specific requirements.

Findings show that, despite implementing the same platform, the eight investigated companies had differing success in aligning the system capabilities to their organizational goals. Successful alignment was helped by balanced governance practices that encouraged inclusivity of the implementation team members and their diverse views on the system, as well as exploratory attitude towards data usage and end user feedback, while employing various controlling mechanisms to ensure actors' commitment and creation of a common vision on how the focal IS fits into their organizational goals.

2 Background

2.1 Implementing weakly structured information systems

IS implementation research concerns the purposeful efforts to deploy information technology (IT) in organizations and the mutual adaptation of both social and technical systems during that process. The question of how to effectively implement IT traces back to the origins of the IS discipline (Churchman and Schainblatt, 1965). Traditionally, IS implementation has been portrayed as sequential processes of multiple stages (Berente et al., 2016; Cooper and Zmud, 1990; Leonard-Barton, 1988). In that view, IS implementation starts with identification of suitable applications of the IS-provided capabilities, followed by organizational and technical adaptation, and ending when the IS application is infused in routine processes and "is no longer perceived as something out of the ordinary" (Cooper and Zmud, 1990, p.124). These stages are deemed important to communicate a clear goal of what the desired outcome should look like and to help align collective action towards that goal (Berente et al., 2016).

Defining the intended outcome *a priori* is relatively straight-forward with *highly structured IS*, that convey clear organizational rules embedded in their technical architecture (Lyytinen et al., forthc.). An example for highly structured IS are enterprise resource planning (ERP) systems that embody a myriad of formalized rules for organizational coordination (Ajer et al., 2021; Berente et al., 2019). However, less attention has been paid to the implementation of *weakly structured IS*, in which "use is not defined initially by organizational rules embedded in the IT" (Eley and Lyytinen, 2022, p. 5113). Instead, these systems provide generic functions to create, store, retrieve and combine digital objects, intended to support users in their daily organizational tasks, such as design, decision-making, or sharing operational knowledge through the system (Lyytinen et al., forthc.). Rather than defining a specific use *a priori*, weakly structured IS are designed to be open-ended, evocative and adaptive, in order to allow its users produce generative and creative outcomes (Avital and Te'eni, 2009; Thomas and Tee, 2022). Thus, the capabilities of weakly structured information systems need to be contextually treated as affordances that allow organizations to utilize these capabilities to match their organizational goals. These affordances are initially unknown and are discovered and shared *hic et nunc* during the implementation process (Du et al., 2019; Lyytinen et al., forthc.). Therefore, defining the intended use of a weakly structured IS *a priori* is not only difficult, but can also be undesirable, as committing to a particular configuration too early can mean missing out on potentially more valuable configurations in the future (Lehmann et al., 2022; Leonardi, 2013) as weakly structured systems are more like "*'empty shells,' to be filled later with shared use and related patterns of activity"* (Lyytinen et al., forthc., p. 4)

Despite a well-established body of research on the implementation of highly structured IS (Arvidsson et al., 2014; Berente et al., 2016, 2019), there has been comparatively little attention paid to the implementation of weakly structured IS (Eley and Lyytinen, 2022; Lyytinen et al., forthc.). Nevertheless, IS research has consistently highlighted the positive aspects of weakly structured IS, irrespective of their implementation. For instance, Boland et al. (2007) describe how the adoption of open-ended 3D-CAD software in a joint construction project led to varied manipulation of digital objects and generated innovative practices and outcomes. Similarly, Krejci et al. (2021) illustrate the empowering effect of low-code platforms on users with limited technical expertise, enabling them to develop innovative solutions collaboratively. Leonardi (2013) describes how different engineering units utilized a collaborative simulation tool to improve both technical processes and knowledge exchange amongst the units. While these studies illustrate the generative potential of weakly structured IS (Avital and Te'eni, 2009), we believe they neglect the potential challenges for organizations, as the open-ended design of such IS may require additional actions to ensure successful implementation.

While IS literature has outlined a variety of potential factors that can lead to IS implementation failure, for instance failure to adapt organizational routines (Arvidsson et al., 2014), incongruent expectations towards technological capabilities or purpose (Orlikowski and Gash, 1994), neglecting potential risks or pitfalls (for an extensive review, see Goedeke et al., 2017), implementation success is commonly characterized as *alignment* between organizational goals and the technological and processual entities of the focal IS (Arvidsson et al., 2014; Thomas and Tee, 2022). The degree of alignment is not static, but can vary throughout the implementation process, as both organizational and technical configurations change over time (Saadatmand et al., 2019). Viewing IS implementation as alignment highlights the fact that no IS a panacea, "one-fits-all" solution, but rather requires a mindful selection of system capabilities that match organizational intent (Mähring et al., 2004).

2.2 Generative governance

Numerous studies on implementing information systems have emphasized the importance of governance as a crucial factor in providing processes and structures for social organization and coordination (Bevir, 2012) to create rules and collective action during implementation processes (Berente and Yoo, 2012; Krancher et al., 2018; Leonard-Barton, 1988; Magnusson et al., 2020). Governance is important because organizations consist of diverse actors with varying interests and perspectives that may not align with those of the implementation team that guides implementation activities (Sharma and Yetton, 2003). Therefore, a key objective of governance mechanisms is to offer guidance to align the interests and perspectives of these actors.

To investigate how organizations align to the open-endedness of weakly structured IS, we draw on the notion of *generative governance*, defined as the organizational norms and actions that provide "the balance between access and control that both enables and constrains the potential for innovation in a generative system" (Thomas and Tee, 2022). The implementation of a weakly structured IS presents a fundamental tension between openness and control - on the one hand, openness is needed to incorporate diverse interests and knowledge to encourage generativity, on the other hand, control is needed to provide proper guidance and structure (Svahn et al., 2017). Thus, the degree of alignment during implementation is a function of how generative governance balances a tension between openness and control, or what prior studies have referred to as "generative balance" (Rossi et al., 2020) or "generative fit" (Thomas and Tee, 2022).

Thomas and Tee (2022) outline four attributes of generative governance: *access*, *technical rules*, *economic rules and cognitive rules* (Figure 1). Governance of access refers to the number and types of organizational actors that are allowed to partake in and shape the implementation process. While implementation is typically guided top-down by a central implementation team, it is common practice to invite bottom-up engagement, for instance by those who are intended to use the system on a daily basis or with expert knowledge on the surrounding processes (Gregory et al., 2018). While disregarding certain actors might mean missing out on important knowledge, inviting too many actors can lead to a “disruptive cacophony of criticism” (Abraham and Junglas, 2011).

Technical rules provide guidance as to which technical and processual entities can be manipulated by organizational actors, and what methods and procedures are most appropriate (Leonard-Barton, 1988; Tiwana et al., 2010). *Economic* rules can indicate which types of implementation outcomes are preferred, for instance by evaluating, rewarding or penalizing certain outcomes (Gal et al., 2014; Tiwana et al., 2010). This may include improving operational efficiency, organizational learning or dynamic capabilities. For instance, the low-code platform investigated in this study could be utilized to save costs by developing chatbot applications and thus reducing the number of personal customer interactions, or be used as an AI learning tool for non-technical employees. Finally, *cognitive* rules can shape the understanding amongst organizational actors of what is allowed and encouraged, for instance by promoting a common organizing vision (Swanson and Ramiller, 1997) that explains the technical capabilities of the IS, why it is being adopted and how it is congruent with existing organizational goals (Ghawe and Chan, 2022; Thomas and Ritala, 2022). Such cognitive rules can help to engage with organizational actors’ tacit and embedded perspectives and assumptions, and can help frame individual actions in the larger implementation context (Nambisan et al., 2017; Raatikainen et al., 2021).

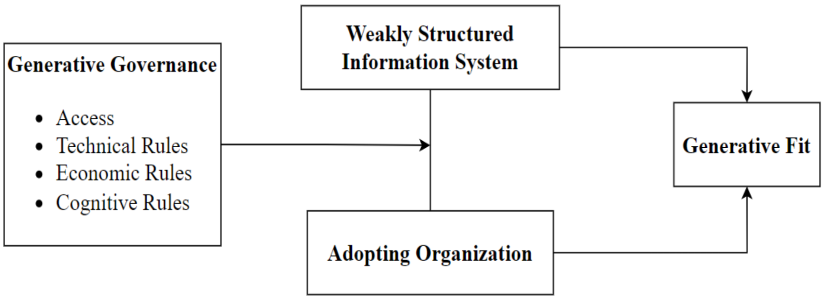

Figure 1. Generative governance in IS implementation (adopted from Thomas and Tee, 2022)

To summarize, while the significance of governance during the implementation of highly structured IS has been studied extensively (Berente et al., 2019; Lyytinen and Hirschheim, 1988), we have limited knowledge about governance in the context of weakly structured IS (Lyytinen et al., forthc.) This limitation is critical because, unlike highly structured IS that convey rules through their technical design, weakly structured IS do not, thus suggesting that governance mechanisms that help guide sociotechnical actions during the implementation process become even more important. To investigate this, the conceptual scaffolding of generative governance (Figure 1) is useful because it acknowledges the relational nature of successful IS implementation and facilitates a more granular look on how governance can help companies balance control and flexibility when exploring the generative potential of IS (Thomas and Tee, 2022).

3 Research Methods

We employed a case study methodology using semi-structured interviews, archival documents, and abductive data analysis (Dubois and Gadde, 2002). A case study approach is suitable to combine data from multiple sources and to investigate “a contemporary phenomenon within its real-life context, when boundaries between phenomenon and context are not clearly evident” (Yin, 2018).

3.1 Research context

We studied the implementation of "Comvers.ai", a low-code AI platform (Iho, 2021), in eight large companies from diverse industries. Comvers.ai allows users to create applications such as chatbots and voicebots, that interact with natural language data. The platform offers pre-programmed application components and data flow visualization, making it user-friendly for individuals without extensive programming knowledge. It also includes modules for storing, analyzing, and visualizing natural language data such as customer support dialogues or online reviews. Comvers.ai has received multiple industry awards for its user-friendly interface, which is designed to cater to non-technical users. The platform is marketed as a powerful support tool for various industries and applications, with easy-to-understand commands and functions, including data visualization features that provide a clear representation of complex conversation flows. One of the main features that distinguishes Comvers.ai from other low-code platforms such as Botpress is its hybrid architecture which combines rule-based linguistic techniques and AI models to create flexible systems capable of broad generalization. These systems can handle a wide range of tasks and environments without further human intervention (Chollet, 2019). The vendor promotes this hybrid architecture as a solution to address the limitations of AI-only systems, as the rule-based techniques enable deployment of applications without large amounts of input data, while the AI models still allow for generative potential and adaptability toward organizational needs.

We applied the following criteria for the case selection: (1) we selected Comvers.ai because its adaptive design and hybrid architecture fit well with our research interest of weakly structured IS; (2) we selected large companies (10.000 - 80.000 employees) across different industries because due to their size, such companies need to rely more on governance than e.g., interpersonal relations, to ensure alignment during IS implementation (Berente et al., 2016); (3) we selected companies that had used Comvers.ai for 2 - 10 years, as differences in enacted governance practices would emerge as salient.

Early observations during data collection revealed significant differences in adoption goals and implementation of Comvers.ai among the eight companies. This resulted in variations in the implemented applications, ranging from selective utilization of Comvers.ai modules in proprietary systems to the creation of chat or voice bots and the development of new AI applications using generic low-code functions. For instance, some integrated Comvers.ai into business processes (E1, A1), leading to expansion, while others struggled with technical functionalities (R1, R2) to improve operational efficiency (see Table 1). These observations prompted us to further examine the alignment between organizational goals and system capabilities, as well as the role of governance in achieving it.

Case Org.	Organizational Goals	Technical Outcomes
E1: Energy 80,000+ 10 years	Improve customer service; automate repetitive customer support tasks	Expanded business: developed 20+ AI tools that generate extra revenue; expanded services with trace data (e.g., maintenance support), fully automated customer support
A1: Automotive 40,000+ 3 years	Attract more customers; improve customer experience	Developed chatbot to support car dealers, increased number of customers; Developed voicebots to improve customer experience during purchasing process
A2: Automotive 50,000+ 3 years	Automate repetitive tasks; Retain employees impacted by automation	Automated external and internal business processes Used low-code platform as learning ground to strengthen technical competencies of business units
T1: Telecom ~20,000 3 years	Acquire technical resources to develop proprietary AI platform	Implemented Comvers.ai natural language processing modules into proprietary AI application to facilitate dialogue management
H1: Hospitality ~10,000 5 years	Adopt AI to build brand awareness and attract more customers	Implemented selected Comvers.ai algorithms into "Digital Receptionist Ella", an AI-based avatar that grew in service functionality and became a key brand element

R1: Retail 40,000+ 2 years	Implement AI as "everyone does it"; reduce number of customer phone calls	Developed rudimentary chatbot after difficulties with AI capabilities. Chatbot failed to be accepted by customers or reduce the number of phone calls.
R2: Retail 70,000+ 10 years	Support customer service; automate repetitive tasks	Aborted implementation of a chatbot due to failure to integrate and update product catalog into Comvers.ai
R3: Retail 20,000+ 2 years	Adopt AI to build brand awareness and attract more customers	Developed chatbot for customer support, failed to gain anticipated traction by customers

Table 1. Organizational goals and Comvers.ai implementation outcome overview.

3.2 Data collection and analysis

We used a combination of primary and secondary sources for data collection (Table 2), including 19 semi-structured interviews with informants from case companies, such as implementation leads, business unit managers, and front-/back-end developers. The interview guide covered three groups of questions: (1) implementation goals and challenges; (2) implementation processes and the actual practices and routines organizations employed; (3) implementation outcomes. The semi-structured format allowed for greater flexibility in the interviewees' responses, enabling them to uncover new details, nuances, and other areas related to the implementation of Comvers.ai not originally covered by the interview guide. These unplanned insights added to the richness of the data (Fusch and Ness, 2015). We recorded and transcribed the interviews using otter.ai, which enhanced data accuracy and completeness. To address the potential limitation of an imbalance in the number of interviews conducted per company, we selected respondents with significant involvement, conducted longer interviews, and used secondary data (Flick, 2009). For instance, we interviewed T1 and H1's implementation leads with extensive knowledge of the implementation process. Although we only interviewed E1 twice, the total duration (240 minutes) was comparable to six interviews with A2 (360 minutes).

In addition to semi-structured interviews, we collected archival and publicly available data, i.e., use cases, and press releases issued in collaboration between the vendor and the case companies, and articles and presentations issued by the case companies on the implementation and use of Comvers.ai. The use cases and press releases provided a snapshot of the initial expectations and goals regarding the platform and its applications, and how these evolved over time. Internal articles and presentations offered insights into the implementation progress, challenges, and aspirations. Combining primary and secondary data sources allowed for identification of both similar and contrasting governance practices employed by the case companies. These data sources provided methodological triangulation, leading to data saturation that emerged from the depth of the data rather than the number of interviews alone (Fusch and Ness, 2015). The nuances of the secondary data sources added to the thickness of the data, enriching our understanding of the case companies' experiences with Comvers.ai.

Source	**E1**	**A1**	**A2**	**R1**	**R2**	**R3**	**T1**	**H1**	**Total**
				Primary Data					
Interviews	2	2	6	3	1	3	1	1	19
Informants*	IL	BM, IL	BM, IL, BD, IT	BM, BD	BM	BM, BD, IT	IL	IL	
				Secondary Data					
Use cases	1	1	1	1	1	1	1	1	8
Presentations	2	-	1	1	1	-	1	-	6
Articles	2	2	1	1	1	1	1	1	10
Press Releases	1	1	1	1	1	1	1	1	8

*(IL – implementation lead, BM – business unit manager; BD – business developer; IT – IT developer/manager)

Table 2. Data Types and Sources

We analyzed our data in three steps using Gioia methodology as a basis (Gioia, Corley, and Hamilton, 2013). In the first step, we built a data structure. We paid attention to statements such as ‘initially,’ ‘we encouraged,’ ‘we presented it as,’ ‘we ended up,’ and ‘it allowed us,’. We followed these statements to understand the initial understanding of the technical capabilities of the platform, such as its low-code architecture, conversational functionality and capacity to capture unstructured data, and organizations' expectations on why they wanted to implement it in the first place. Additionally, this strategy allowed us to trace the actions organizations took (e.g., how did they govern?). In the second step, we developed the categories of the second-order themes in a discussion based on the first-order concepts. We linked these actions to the outcomes that followed. Lastly, at the aggregate dimension we explored different concepts to theorize our observations, including affordance and framing theory, eventually landing on generative governance (Thomas and Tee, 2022) to understand how organizations adapted to the malleable and open-ended nature of Comvers.ai.

4 Results

Our empirical findings indicate major differences in how organizations that implemented Comvers.ai aligned their diverse organizational goals with the system’s open-ended technical capabilities (s. Table 3). Using the concept of generative governance (Thomas and Tee, 2022), we outline below our findings on the governance practices enacted during implementation and how those impacted alignment.

Key practices	Illustrative Quotes
ACCESS	
Encourage implementation team diversity. Heterogeneous implementation teams to incorporate diverging views	● *“The IT developers don’t have the knowledge that resides within business. The exchange of this knowledge creates a healthier environment for these automation solutions to grow.”* - Implementation lead, A1 ● *“When a business wants to build a conversational AI system, they need to account for many resources like data scientists that they do not always have. And we've got everybody on our team.”*- Implementation lead, T1 ● *“It is important to have those who doubt the solution; they have the knowledge how it could fail. And you need that. Having some negativity in the team turned out to be very positive.”* - Implementation lead, E1
Demand commitment from the implementation team. Commitment of implementation team members to extend responsibility for successful implementation	● *“We always take some members from the customer unit, for let's say six months, [to jointly]build the initial bot so they can learn from us how to do it, what to look at, what to observe, how to evaluate whether a certain outcome works well or not.”* - IT unit manager, T1 ● *“Bring [the doubters] closer and listen to them. Let them complain, but then ask, 'what is required to make it work?'”*- Implementation lead, E1 ● *“Ella is interconnected with other systems, so she requires attention from the technical experts, when a technical outage or an error occurs. She also requires the support of the business units who can answer and assist guests.”* - Implementation lead, H1
TECHNICAL RULES	
Encourage experimentation with system capabilities Joint hands-on workshops Customer feedback	● *“Through user feedback and experimentation, we realized that at every node in a dialogue flow, you need to allow the chatbot to exit. Because the end user may get stuck at some point.”* Implementation lead, T1 ● *“Business units go through this onboarding process to understand the platform, its features and capabilities.”* - IT front-end developer, A2

	● *"Ella encourages our guests to provide feedback to understand the user experience for her to improve over time. […] Many of her features have been added following customer insights"* - Implementation lead, H1
Iteratively adapt new system capabilities Developed and tested prototypes, scaled carefully after testing and feedback Continuous update of platform databases and algorithms Additional applications, e.g., derivative innovations from digital trace data	● *"Don't build a bot, which can do everything. Build one use case at a time and be clear with your customer on what it can do. Then expand it case by case."* - Implementation lead, T1 ● *"When you build a bot, you need to look at it, just as if it were a human agent. You've got to continuously update it making sure it is aware of the new processes and services. Otherwise, you will be caught by surprise because your system can't handle it."*- Implementation lead, T1 ● *"Ella is connected to other systems that come together to ultimately create her guest experience. The inherent challenge in this is that we need to routinely monitor and update these systems and their databases to make sure they are up-to-date."* - Implementation lead, H1 ● *"We saw so many questions about [an expired recycling campaign] that the marketing manager in Ireland decided to revive this campaign"*- Business manager, A1
ECONOMIC RULES	
Balance operational efficiency and generative outcomes Clear short-term goals why platform can provide value Outlook on system's generative potential to encourage new value opportunities	● *"[the chatbot]is never offline. It can provide instant support to the customer. They never need to wait to be assisted"* - IT developer, A2 ● *"customers [receive support] any time of the day on their smartphone devices, e.g., while walking around the factory"* - Implementation lead, E1 ● *"AI-based chatbots and voicebots are still an open playground, not all possibilities have been explored, and for an automotive industry, there are still lots of new opportunities … "*- Implementation lead, A1 ● *"[conversational applications are] the next step in our delivery of great support. It is like having a technical expert at your fingertips, ready to answer your technical questions anytime."* - company documents, E1
COGNITIVE RULES	
Legitimize system as part of organizational vision Clear rationale for how IS fits into org. long-term goals Transparency on how IS fits into organizational vision	● *"Many other departments approach us asking to integrate [our chatbot] for [various purposes]; things they never imagined before. We see this chatbot as a new touchpoint to the users. It sparks ideas on how it can be used in other contexts within the company."* - Implementation lead, A1 ● *"The other thing is being transparent and keeping everybody on the team up-to-date. The better we communicate, the better we know who is doing what and why we're doing this, how this all binds together. The better we achieve that, the better the platform becomes."* - Implementation lead, T1

Table 3. Summary of the key findings

4.1 Access

For governance of access, findings indicate that organizations with higher degree of alignment tended to **encourage implementation team diversity**. Several interviewees highlighted the benefit of inviting a heterogeneous mix of employees in the implementation process to gain a holistic view of both technical capabilities of the platform (IT developers) and business processes that might benefit from it (business developers). An A2 implementation lead emphasized the opportunity to exchange crucial knowledge across departments and align expectations early on: "*The IT developers don't have the knowledge that resides within business. The exchange of this knowledge creates a healthier environment for these automation solutions to grow."* Similarly, an E1 implementation lead noted they invited sales and manufacturing teams to participate in the implementation process, to gain their knowledge about both how E1 products were produced and used by end customers. This helped to make architectural decisions to align the platform configuration with customer needs, e.g., by creating a comprehensive database on product specifications. They added: *"So, we had people who knew the product, and people who run the machines that the product goes into, because many questions might have both facets. […] You don't just need people who know your products. You need people who know where they go."* This knowledge diversity could also help recognize potential tasks for the near future, for instance to react to changing customer demands or maintain various platform components. Even though its vendor presented Comvers.ai as a 'plug-and-play' solution, interviewees noted that certain functionalities would require continuous attention to keep the platform updated: *"There will always be tasks purely IT-driven, i.e., the front and back-end, all the integrations, and purely business/content-driven, i.e., updating the questions and training [the bot].",* A1 implementation lead.

As Comvers.ai was designed for natural language data, interviewees saw benefits in including not only different departments, but also different genders, ethnicities and cultural backgrounds. This helped make technical applications more robust by incorporating tacit knowledge on language. The E1 implementation lead emphasized that diversity as *"really the key [because]they structure sentences or use language differently. […] Ten people were involved in these workshops, and each would have asked the same question in a totally different way".* Our empirical findings indicate that organizations with higher degree of alignment encouraged their implementation team members to share the doubts and negative views about the platform and its applications, stating that: *"it is important to have those who doubt the solution; they have the knowledge how it could fail. And you need that. Having some negativity in the team turned out to be very positive.",* E1 implementation lead.

Conversely, companies with implementation teams consisting of mostly business managers struggled with the technical complexity. For instance, the R1 implementation lead acknowledged difficulties in initially understanding the Comvers.ai capabilities because the vendor was "*talking in this IT language and this coding language that we didn't know anything about.".* The Comvers.ai vendor then conducted a training session for R1 employees, although a R1 business developer noted they did not learn much because "[*the vendor instructors] were used to training IT people, but we were businesspeople, and we didn't follow at all."* These early difficulties led to R1 omitting the more advanced machine learning capabilities later on out of concern for potential business risks.

Furthermore, findings indicate organizations with higher degree of alignment **demanded commitment from the implementation team members.** This was noted as helpful by putting the responsibility for a successful implementation of the Comvers.ai platform not purely on the IT unit. While several IT developers noted it was common that business units would simply *"put an order with IT and IT fixes it up"* (A2), they noted the open-ended design of Comvers.ai required commitment of those departments that "*require a [Comvers.ai application] to pass the so-called business knowledge. We can put in the best IT developer, but if he doesn't really know what he's supposed to solve, it is hard."*, IT unit manager, A2. Similarly, a T1 implementation lead actively asked members of the customer support unit to jointly with IT "*build the initial bot for six months, so that they can learn from us how to do it, what to look at, what to observe, how to evaluate whether a certain outcome works well or not.".* This in turn would allow the customer support unit to be more independent in the future to *"maintain and further develop these applications without any [IT] help".* Extending the responsibility for implementation success also helped IT units to deal with potential negativity they faced when things did not go as planned. For instance, the E1 implementation lead noted it was common in IS implementation for some departments to express vocal criticism or frustration about specific features, leading to disengagement. Instead of ignoring those critics, it was more fruitful to "*bring them closer and listen to them. Let them complain, but then ask, 'what is required to make it work?'".* Those discussions were described as particularly useful to recognize and remedy various misalignments because "*the biggest doubters are also those with the knowledge how it could fail. And we need that".*

4.2 Technical Rules

Organizations with higher degree of alignment between the technical platform capabilities and their organizational goals **encouraged experimentation with system capabilities**, for instance through joint hands-on workshops. These joint workshops provided a creative space where employees could experiment with the low-code capabilities and design different prototype applications like chatbots or text analysis applications. Using these prototypes as boundary objects, IT and business employees were able to learn about each other's respective business and technical processes, and how they could be included in later Comvers.ai applications: *"we would typically spend a full day just prototyping one [business process] within Comvers.ai. It was very different to anything the team had done before, and they all loved it. [Seeing our business process visualized as low-code blocks] also gave us a better understanding of our own business.",* E1 IL. Similarly, an A2 IT unit manager noted that such experimentation helped to discover new applications that had not been considered previously. They described one instance where employees experimented with analyzing emails sent to customer support and were surprised to see that their assumptions on what customers were primarily concerned with "*were quite wrong. [...] So that was really interesting to see that we could extract all that data and do analysis [and potentially] solve that problem".* Interviewees remarked that, while beneficial, it would be difficult to hold such extensive prototyping workshops on a regular basis. To encourage continuous experimentation, most organizations thus set up internal communication channels, e.g., on Slack, where different departments involved in the implementation could ask for help or share updates and best practices. The A2 implementation lead noted that, given the serendipitous trajectory of the implementation process, it was difficult to cover all necessary knowledge "*during the onboarding, which is why it's helpful [for all developers to communicate and] share more 'advanced' knowledge."*.

Conversely, we found that organizations that discouraged technical experimentation struggled later on in implementation. For instance, R1, after initial struggles with implementing machine learning (ML) modules, was hesitant about exploring those further because "*we couldn't control what [the algorithm] was learning and that made a lot of issues. [...] ML is probably perfect for small companies. But for us, it can definitely screw us up big time.",* R1 implementation lead. Subsequently, R1 used Comvers.ai to develop chatbot applications using simple if-then rules instead of ML modules. This rudimentary chatbot struggled to understand customer inputs, leading to many customers to ask for a human contact out of frustration "*because customers just want a correct answer right away"* (R1).

Furthermore, we found that **iteratively adapting new system capabilities** during implementation helped organizations to uncover the system's technical capabilities over time. Although Comvers.ai was marketed as a 'plug-and-play' solution that could be rolled out rapidly on a large scale, several interviewees said they preferred to start on a small scale first. Many had never worked with natural language data before, and although Comvers.ai provided several pre-programmed modules to process such data, understanding the underlying mechanics was often difficult. For instance, A2, in order to explore different sentiment analysis features, developed their first chatbot to only handle the ten most frequently asked customer questions, and then iteratively adding "*different contexts, expanding the knowledge base. [Starting on a small scale] made the initial phase quite smooth because after each iteration, we could decide what to focus on next."*, A2 IT unit manager. Some interviewees expressed feeling overwhelmed by Comvers.ai's open-ended design, making it difficult to prioritize what technical feature to add next. To mitigate that, A1 for instance used customer focus groups to test different prototypes, and "*based on their feedback, we'd either stop developing [that feature], modify it, or continue. After we develop it, we'd run it in the live version and let [users] play with it and see if it performs as expected"*, A1 implementation lead. Similarly, the E1 implementation lead reflected that overcoming hurdles in the initial implementation phase was helped by "*continuously analyzing the [user] data, [and] addressing the most common and severe [application] failures on a daily basis."* Interestingly, this iterative rollout helped discover new affordances in the system companies had not considered before. For example, an A1 business manager described how they initially expected the system to mainly reduce the workload of the customer support unit, but then started to use digital trace data as business intelligence, for instance when "*we saw so many questions about [an expired recycling campaign] that the marketing manager in Ireland decided to revive this campaign"*.

Conversely, R1 and R2 admitted they were overly optimistic, expecting the system to run smoothly and cover a "*broad, broad, broad, spectrum of [natural] language data. We thought it could answer things like, 'how many calories is there in a pizza ?' […] [It took some time to realize] we had to make it a lot* *more simple"*, R1 business developer. At R2, the decision to abort implementing Comvers.ai was strongly influenced by their realization that they had underestimated the *"amount of time needed to improve the system's knowledge base [until] it actually would save us time."*, R2 BD.

4.3 Economic Rules

Across the investigated companies, we found different interpretations to what would constitute a valuable implementation outcome. Whereas some defined KPIs that should be achieved, such as "*reducing the number of customer phone calls by 20%"* (H1), others saw implementing Comvers.ai as part of more strategic digital transformation efforts that sometimes lacked specification "*how these big, complex digitalization efforts would [materialize] on the ground level*", R1 business developer. Overall, our findings indicate that striking a suitable **balance between operational efficiency and generativity** helped implementation efforts. On one hand, aiming for operational efficiency helped create tangible, short-term goals. For instance, the E1 implementation lead described an early goal as allowing "*customers to [receive support] any time on their smartphone devices, e.g., while walking around the factory*", which led E1 to focus its initial efforts on building a robust mobile application.

On the other hand, exploring the generative potential of Comvers.ai helped reveal creative applications or secondary value opportunities. For example, E1 recognized a strategic long-term value from the system to educate their customers on the environmental impact of their products, thus strengthening the company's brand awareness: *"Instead of just saying this is the right oil for your manufacturing plant, the chat- or voice bots can offer choices which would give longer [component] life or lower emissions, and appeal to the customer's personal psyche with an environmental slant to help sell our products."*, E1 implementation lead. The implementation lead at A1 remarked that personally, they saw Comvers.ai's long-term value in integrating multiple other systems to build an extensive knowledge base about customer preferences: *"AI-based chatbots and voicebots are still an open playground, not all possibilities have been explored, …and for an automotive industry, there are still lots of new opportunities that can be used, even in the process of buying a car"*. The same person however noted it was difficult to get support within the organization for such a large-scale undertaking, because *"business value is still quantified by the [C-suite]. [...] It is difficult to justify a good Comvers.ai business case if it does not have a direct, measurable impact"*.

4.4 Cognitive Rules

Finally, we found organizations with higher degree of alignment made efforts to **legitimize the system as part of their organizational vision.** Various interviewees noted they presented the implementation of Comvers.ai not only as technical novelty, but as an innovative tool that would help achieve their organizational goals. For instance, E1, who emphasized their strong customer orientation in their web presence, presented the value of Comvers.ai-based chatbots to its customers as "*the next step in our delivery of great support. It is like having a technical expert at your fingertips to answer your questions anytime."*. Similarly, H1, a hotel chain whose brand identity included catering to local nightlife, described their chatbot online as "*digital receptionist Ella - I'll hook you up if you're looking for trouble"*. Interviewees also noted how this also helped create understanding in case of potential technical bugs. This was because new IS were often initially perceived as 'magic*'* by employees, only to veer towards frustration when those first expectations were not met. Linking the technology to a more long-term vision helped emphasize that users would ultimately benefit from the system, and it was worth fixing potential bugs "*to improve [the applications], to catch more and more user intelligence, and ultimately increase customer satisfaction",* A2 IT developer. Conversely, the R1 implementation lead reflected on their implementation team mostly working in isolation from other departments, which led to some colleagues openly questioning the purpose of Comvers.ai because *"they probably did not see what Comvers.ai [and the applications we built] could achieve"*.

5 Discussion

While prior IS research has suggested that the increasingly open-ended and generative design of weakly structured IS may challenge existing assumptions about the interplay of technical and organizational systems (Avital and Te'eni, 2009; Lyytinen et al., forthc.), empirical studies have predominantly focused on implementation of highly structured IS (Abraham and Junglas, 2011; Krancher et al., 2018). In this paper, we intended to go deeper into understanding how different governance practices impact successful alignment between technical capabilities of a weakly structured IS and the goals of the adopting organization. Three particularly noteworthy insights emerged from this study.

First, in line with prior research (Avital and Te'eni, 2009; Boland et al., 2007), this study shows how organizations benefit from the open-ended design of weakly structured IS by leveraging their generative potential, for instance by integrating generic-purpose modules like data analysis modules, or using digital trace data to create derivative innovations (Howison et al., 2011; Yoo et al., 2012). However, we also illustrate some of the challenges that organizations encounter when implementing a technical system that offers "seemingly unbound possibilities for recombination, rapid scaling and continuous innovation" (Lehmann et al., 2022). Although the eight investigated companies adopted the same system, a low-code AI platform, they did so with differing goals in mind and achieved different outcomes. This underlines implementing a technical system that is "emergent by design" (Nambisan et al., 2017) heightens the need for implementation teams to continuously assess both technology and their organizational environment to identify suitable problem-solution pairings (von Hippel and von Krogh, 2015) that may potentially only emerge during use (Volkoff and Strong, 2013).

Second, the open-ended design of weakly structured IS allowed some companies to continuously adopt new features even 10 years after initiating implementation. Highlighting this perpetuity, Lyytinen et al. (2022) note that such implementations rarely enter a final routinization stage where configurations of weakly structured systems stabilize because they "engender little or no expectation of a new regulatory order imposed extramurally". Consequently, understanding the technical capabilities of such systems takes time (Chan et al., 1997), and organizations may prolong the implementation phase to continue discovering and actualizing new affordances (Volkoff and Strong, 2013). This is particularly the case when system capabilities become more potent the more they are used, thus allowing organizations to identify new suitable use cases (Leonardi, 2013). An effective illustration was A1 who implemented Comvers.ai in an interdependent loop of feeding data into their ML models, gaining new business intelligence and adapting the system in new contexts, thus collecting more data, training ML models, etc. Rather than a sequential process of 'unfreeze-implement-freeze' (Berente et al., 2016; Cooper and Zmud, 1990), implementing a weakly structured IS has more resemblance with "metahuman systems" (Lyytinen et al., 2020) where humans and machines jointly learn to create original systemic capabilities.

Third, our empirical study illustrates specific governance practices that balanced openness and control to guide collective action without "excessively constraining the desired level of generativity" (Wareham et al., 2014, p. 1195). On one hand, organizations *controlled* the implementation process by setting boundaries, defining obligations for different departments or setting achievable, short-term goals. For instance, various organizations described how holding IT and business units jointly accountable for implementation success helped define tasks and incorporate the expert knowledge of those who would normally "complain the loudest". Although, as some interviewees pointed out, it is common in IS implementation that IT experts take sole responsibility, this study suggests that weakly structured IS especially require business and IT units to closely collaborate and exchange necessary expert knowledge to embed the system in practice (Bumann, 2022; Levina and Vaast, 2005). Interestingly, we found that those organizations that controlled their pace in implementing new functionalities, rather than following the 'plug-and-play' mentality advised by Comvers.ai's vendor, were more successful in identifying applications that suited their organizational needs. As Lehmann et al. (2022) note, although the generative potential of digital technologies allows for rapid scaling, it needs to be continuously reconciled with technical legacy systems and the organizational context.

On the other hand, organizations ensured *openness* by acknowledging the system's evolvability and generative potential. This was achieved by portraying new technology as an element in the long-term organizational vision, while leaving sufficient ambiguity to encourage experimentation on how the system could be utilized to achieve that vision (Swanson and Ramiller, 1997). Experimentation was helped by creating interdisciplinary physical or virtual meeting spaces where users could freely 'play' with the system capabilities and build prototypes that could be used as boundary objects (Pershina et al., 2019). Allocating resources for experimentation, however, needed support from the C-Suite, which was sometimes difficult due to the lack of immediate measurable impact in some potential use cases, such as collecting more data or adapting ML algorithms. This is consistent with prior studies on valuing digital assets, such as big data or algorithms (Berente et al., 2021; Günther et al., 2017), and suggest that organizational decision-makers may consider more lenient economic rules when implementing weakly structured IS. Overall, this study highlights the competing concerns that organizations need to balance when adopting new digital technologies, and the importance of governance to manage the interdependence between technical and organizational systems (Svahn et al., 2017).

6 Conclusion

Our research contributes to the existing literature on IS implementation (Berente et al., 2016; Cooper and Zmud, 1990) by presenting an empirical account of governance practices that have facilitated or impeded the implementation of weakly structured IS. Our study adds nuance to prior research that emphasized the potential for these systems to enable serendipitous innovation (Avital and Te'eni, 2009) by highlighting the organizational challenges when facing a plethora of potential use cases. Our findings demonstrate that successful governance practices must balance short-term goals with the long-term exploration of generative potential, underscoring the need for organizational and technical systems to learn and develop novel systemic capabilities in tandem (Lyytinen et al., 2020).

Furthermore, our findings can also guide successful implementation efforts of information systems. First, it is beneficial to adopt a sociotechnical perspective, rather than solely a technical perspective, when implementing weakly structured IS. The organizations that successfully aligned technical capabilities with organizational goals considered not only immediate changes but also broader technical, cognitive, and economic factors that would be affected by the implementation process, similar to other organizational change efforts. Therefore, a balanced governance approach is necessary, providing both control, such as assigning clear roles, and openness, such as organizing meeting spaces to explore the system's generative potential. By adopting this approach, organizations can foster interdependent development of organizational and technical capabilities throughout the implementation process.

Secondly, our study offers suggestions to vendors of weakly structured IS to help facilitate pre-implementation. In our case, the vendor presented the system as a 'plug-and-play' solution with an accessible and modular design to facilitate a rapid implementation phase. Interestingly, we found instead that several organizations preferred to decelerate the implementation process and iteratively implement and explore new features. As such, vendors should be mindful of how they present these systems, and consider designing different pitches for the system's affordances for different users, based on their technical knowledge and needs. Organizations that want to explore AI capabilities may benefit from tutorials for a broad range of potential use cases, while those that know they want a chatbot may only require a narrow explanation.

Our study is not without limitations. First, we had an imbalanced sample size, but to overcome this, we carefully selected respondents who had significant knowledge of the implementation process. We also conducted more extended interviews and triangulated our data with secondary sources to ensure internal validity of our findings (Flick, 2009). Therefore, we are confident that our data is rich and informative. Nonetheless, future studies may build on our findings with more in-depth, single-case studies of implementing weakly structured IS. Second, we relied on retrospective data collected from the interviewees to understand multi-year implementation processes. Although this approach may be prone to selection bias and recency bias, which could potentially impact the accuracy of our data, we made efforts to mitigate this limitation. Our sampling strategy included a diverse range of case companies, spanning a spread timeline of their engagement with Comvers.ai.

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