Master's thesis

NTNU
Norwegian University of Science and Technology
Faculty of Information Technology and Electrical Engineering
Department of Computer Science

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Strategic deadlock in platform ecosystems

A case study of the OSDU data platform

Master's thesis in Digital transformation
Supervisor: Thomas Østerlie
June 2025

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Abstract

This master's thesis investigates how the OSDU platform challenges established collaboration practices and actor roles in the Norwegian oil and gas industry, and which barriers hinder the development of a coordinated and well-functioning platform ecosystem. The study is based on a qualitative case study involving interviews with employees from operator companies, one informant from a supplier company and one informant from a cloud provider. The operators represent the main perspective, providing in-depth insight into their reflections and experiences. At the same time, the emphasis on one dominant actor group entails certain limitations, as it offers less insight into how other key stakeholders, such as IT suppliers perceive and are affected by the OSDU platform. By combining the empirical findings with theories on different platform types and ecosystem governance, the thesis highlights the challenges of aligning technological development with organizational anchoring in an industry context characterized by decentralized ownership and complex interaction.

The analysis suggests that OSDU has the potential to represent a shift in how the oil and gas industry manages data and creates value. However, realizing this potential requires changes beyond the technological domain. A lack of leadership, fragmented incentives, and strategic deadlock are shown to hinder progress. In the platform ecosystem, actors are mutually dependent on one another, yet the absence of structures prevents them from coordinating their efforts and distributing value fairly. The findings also indicate that established platform concepts, such as network effects and complementarity, take on different meanings in industrial contexts characterized by shared ownership and unclear governance structures.

The study concludes that OSDU requires not only technological implementation, but also a fundamental change in how collaboration, governance, and roles are organized at the industry level. The platform's continued development depends on clearer governance structures, defined roles and a model of ownership, and incentive structures to support fair value creation. While regulatory support may facilitate this process, the long-term viability of the platform relies first and foremost on the actors developing a shared understanding of leadership within ecosystem-based organizational forms.

Preface

This master's thesis marks the conclusion of my studies in *Digital Transformation* at the Department of Computer Science at the Norwegian University of Science and Technology and was written in the spring of 2025. The final thesis has been both demanding and educational and has provided me with valuable insight into how technological solutions and organizational structures meet and sometimes collide in practice.

I would like to extend my sincere thanks to the informants who contributed their time, openness, and insight. Their patience and willingness to share experiences and explain a complex phenomenon in an understandable way have been crucial for this study. I also wish to thank my supervisor, Thomas Østerlie, who has not only provided academic support and constructive feedback, but also helped me transform my own reflections and ideas into a clear line of thought with analytical coherence. His reminder that research is a demanding process requiring both patience and reflection has given me perspective and helped me maintain courage in the face of my own inexperience.

Thanks also to my fellow students for the sense of community, for shared concerns, and for the small breakthroughs along the way. Although this thesis is my own work, it has been reassuring to know that I was not alone in the storm, as there were several of us in the same boat.

Finally, a heartfelt thanks to my family and friends, who have been encouraging and supportive throughout the entire process. Thank you for listening to my ideas, even when they were unfinished, shaped by stress and little sleep, and often expressed as streams of thought that barely made sense even to myself. Because you cheered me on when my motivation was low and frustration was high, it became easier to get through both long days and late nights.

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Acronyms/symbols

OSDU	Open Subsurface Data Universe
DMC	Design-Meet-Commit
API	Application Programming Interfaces
SDK	Software Development Kits
IT	Information technology

1 Introduction

Digitalization has become a prerequisite for modern enterprises, with an increasing number implementing digital tools and technologies to streamline work processes, improve decision-making, and create new business opportunities. Digital transformation results in a growing amount of data being produced and managed in real time. The large volumes of data generated daily make interoperability, that is, the ability of systems and components to exchange and use information seamlessly an increasingly critical factor for businesses (Sloot et al., 2024).

Data and technology have become an integral part of enterprises' overall resource base and constitute an important element of their strategic portfolio. Most enterprises manage extensive portfolios of investments, products, services, and digital systems, where each unit contributes to the company's overall strategy and value creation. Over time, the composition of their technological portfolio changes, influenced by both internal and external factors. Enterprises must therefore continuously assess how the different parts of this portfolio contribute to the company's overarching objectives and competitiveness (Peppard & Ward, 2016).

Although digitalization and technological investments provide access to large amounts of data and advanced systems, the utilization of these resources depend on seamless integration and secure interaction between systems (Gasser, 2015, as cited in Hodapp & Hanelt, 2022). Enterprises internally, as well as larger digital ecosystems, encounter significant obstacles in integrating their solutions: either within the underlying digital business ecosystems, that is, the set of digitally interconnected actors relevant for co-creating and co-owning value within a specific value creation domain, or in the effort to build such ecosystems on their own (El Sawy & Perreira, 2013; Hodapp et al., 2019; as cited in Hodapp & Hanelt, 2022). The involvement of various actors such as hardware manufacturers, ICT companies, startups, and public institutions each operating with different technological solutions and incentives further increases the challenges of leveraging technology (Nicolescu et al., 2018; Wortmann & Flüchter, 2015, as cited in Hodapp & Hanelt, 2022).

In this landscape, digital platforms have received increasing attention. The platform model enables the connection of different actors within a shared framework for data sharing and interaction, functioning not only as a technological solution but also as an organizational approach to restructuring value chains and relationships (Tiwana, 2014; Parker et al., 2016). Platform-based ecosystems are characterized by network effects, modularity, and open interfaces, and make it possible for both producers and users to interact in new ways (Yoo et al., 2012, as cited in Hodapp & Hanelt, 2022).

Digital technology platforms have become central tools in enterprises' innovation efforts as they enable the extension of an actor's product system core functionality with a wide range of complementary modules. Platforms are designed to combine and customize software modules, and they constitute a key prerequisite for combinatorial and distributed collaboration within digital business ecosystems (Eaton et al., 2015; Yoo et al., 2012; Teece, 2018, as cited in Hodapp & Hanelt, 2022).

The OSDU data platform is a digital solution developed to collect, standardize, and make subsurface data accessible across companies, systems, and professional domains. The literature highlights how industry platforms such as OSDU can enable new business models, promote innovative technologies, and reduce inefficiencies (Sletten et al., 2023). The transition to a platform logic has proven to be challenging. Many companies are still in an early phase of adaptation, and the implementation creates uncertainty regarding how established structures, collaboration practices, and actor roles should be adjusted to the new framework. This makes it difficult to assess the platform's long-term effects. At the same time, it is interesting to examine how actors respond to this change in practice. Research has suggested that a successful introduction of digital platforms in industrial contexts, such as OSDU, requires more than technological adaptation. It also requires organizational changes and strategies to overcome technical, cultural, and structural barriers (Parmiggiani et al., 2022; Bygstad & Hanseth, 2018).

One of the central characteristics of digital platforms is its network effects, where the value of the platform increases with the number of participants (Parker et al., 2016; Tiwana, 2014). While this mechanism is often described in consumer markets, there is less research on how network effects operate within industries with complex business relations and established structures such as the oil and gas industry. It is therefore relevant to examine how platform logic and network effects shape the interaction between operators, IT-vendors and other actors, and which consequences this has for established roles, collaboration practices and power balances in the industry.

The purpose of this thesis is to examine how the OSDU data platform challenge established collaboration practices and actor roles in the oil and gas industry, and what barriers hinders the development of a coordinated and functioning platform ecosystem. Through a qualitative case study of OSDU, the analysis explores how different actors, particularly operating companies and IT providers, respond to the technological and organizational changes represented by the platform. The study investigates how a lack of coordination, insufficient standardization, and divergent understandings of platform logic affect interaction and role distribution. Furthermore, it highlights how shifting power relations, unclear governance, and weak strategic anchoring contribute to a platform ecosystem characterized by strategic gridlock and limited participation, despite a high degree of interdependence among actors.

1.1 Case Description

Norway has had a long-standing commitment to digital innovation in the oil and gas industry, with digitalization initiatives ongoing for several decades. Oil service companies began exploring artificial intelligence and developing solutions for digital oilfields as early as the 1990's, although many of these solutions have only been partially implemented (Molde & Haga, 2018). Furthermore, the industry has been collecting and accumulating subsurface data for over 40 years, which has contributed to the development of data-driven solutions (Parmiggiani et al., 2022). A survey by DNV shows that digitalization has been given higher priority in Norway than globally. In 2017, 52% of Norwegian oil and gas actors expected increased digitalization within their own organization, compared to 39% globally, and 65% placed digitalization at the top of the list of technologies they wanted to research, pilot, or implement, compared to 55% globally (DNV, 2017). The statistics indicate that Norway is ahead in the digital transformation of the industry, where changes that are regarded as digitalization initiatives today have been ongoing for many years. Digitalization can therefore be understood as an evolution rather than a revolution (Gressgård et al., 2018).

Industries with a high degree of digitalization often face challenges related to low interoperability, and the Norwegian oil and gas industry is no exception. Although an increasing number of systems and sensors are being connected to improve self-configuration, fault detection, and interaction, technological heterogeneity and lack of standardization create major compatibility issues, where the differing standards of legacy and proprietary systems prevent them from working with newer ones (Gressgård et al., 2018). Data are stored and processed in specialized tools and databases with different formats, making exchange and integration difficult (Parmiggiani et al., 2022). Legacy systems are maintained even after being taken out of active use because they contain unique data that are not available elsewhere. At the same time, system heterogeneity increases over time due to technological development, changing business strategies, and companies' attempts to avoid vendor lock-in. Large companies regularly replace application environments, and mergers and acquisitions introduce new systems and databases, further reinforcing data fragmentation (Parmiggiani et al., 2022).

A distinctive feature of the oil and gas industry is the great diversity and high complexity of upstream data, which includes everything from seismic surveys to well logs and reservoir models. These data have long been fragmented and characterized by heterogeneity, stored in various formats such as paper archives and legacy software systems. This hampers access, collaboration, and innovation, resulting in inefficient work practices (Halsey, 2024; IBM, n.d; Sletten et al., 2023; Halsey, 2024). Information storage has also proven to be a significant challenge in the industry, where data are often accessible only to specific departments and remain isolated from the rest of the organization (Webopedia, 2024). This phenomenon is referred to as data silos. While silos are not inherently problematic, they become a challenge when no connections exist between them. This makes it difficult to share and effectively utilize data across teams and organizations (Bin Azmy et al., 2021; Patidar, 2023; Bygstad & Hanseth, 2018). Consequently, established information structures challenge opportunities for collaboration, innovation, and coordination in a common platform ecosystem. This landscape of technological heterogeneity and isolated data environments constitutes a central barrier. The need for standardization and integration is therefore not only technical but also strategically important for realizing value creation across actors (IBM, n.d).

To address these challenges, the OSDU Forum was established as an industry initiative. Its objective is to create an open, technology-independent data platform that unites actors across companies and disciplines while standardizing data governance (Halsey, 2024). This aligns with recommendations for an industry-led initiative to develop holistic solutions for digital collaboration, facilitating new forms of cooperation in the sector (Gressgård et al., 2018). The collaborative initiative has developed the OSDU Data Platform, representing a digital transformation in the oil and gas industry where traditional methods of data management and collaboration are being challenged (Halsey, 2024).

The OSDU Data Platform provides a unified data format that can be used by different actors in the oil and gas industry, helping to address challenges related to fragmented data and inefficiencies through increased interoperability (Schlumberger, n.d). Platforms enable better data management, seamless integration across systems, and more efficient use of digital tools across organizational units (Tiwana, 2014; Bygstad & Hanseth, 2018). By offering seamless access to data and a standardized format, data duplication is reduced, and a more common interpretation of data can be achieved, thereby improving communication and collaboration (Parmiggiani et al., 2022; Barré et al., 2022). The platform enables secure and efficient use of subsurface data, while also fostering technological connections between different professional domains in exploration and production. By providing an open framework for external developers, it supports the development of system-independent applications, which in turn facilitates faster implementation of digital initiatives (Schlumberger, n.d; The Open Group OSDU Forum, n.d).

Despite increased digitalization in the oil and gas industry, developments have resulted in a fragmented digital infrastructure characterized by diverse systems, data standards, and vendor-specific solutions (Bygstad & Hanseth, 2018). This has led to data silos consisting of isolated datasets that are difficult to share or reuse across organizations and internal departments. The lack of interoperability between systems and professional domains has increasingly been recognized as a barrier to collaboration, efficient resource utilization, and data-driven innovation (Parmiggiani et al., 2022; Gressgård et al., 2018). Although OSDU is often described within both industry and literature as a technological solution to challenges related to data silos, system heterogeneity, and inefficient data use, the platform also represents a deeper paradigm shift. The transition to an open, standardized, and shared framework enables new forms of collaboration and value creation, while at the same time challenging established actor roles, vendor relationships, and industrial structures. Such changes contrast with the technical literature, which mainly focuses on interoperability and data access, while giving little attention to how the platform transforms the industry toward a platform ecosystem. In this thesis, I examine how the transition to a platform-based model affects established modes of collaboration and actor roles, as well as the barriers that emerge and hinder the establishment and development of the OSDU platform ecosystem.

2 The Concept of Platforms: Different Theoretical Approaches

The literature on platforms is extensive and diverse. To provide a structured understanding of the phenomenon, this chapter distinguishes between two levels: different types of platforms, and different theoretical perspectives on what platforms are and how they function.

2.1 Approaches to Understanding Digital Platforms

Researchers have approached the concept of platforms from different perspectives. Attempts to systematize the field have identified several common themes across perspectives. Pauli et al. (2021), building on Gawer (2014) and Schreieck et al. (2016), highlight that the source of platform success lies in their dual role as both a technological foundation and a market intermediary. Hein et al. (2019) extend this view by highlighting a sociotechnical perspective that integrates technology and markets. Platform research can thus be divided into three main perspectives: a market perspective, where platforms are viewed as market mechanisms (Parker et al., 2017; McIntyre & Srinivasan, 2017, as cited in Hein et al., 2019); a technical perspective, where they are understood as technological infrastructures (Tiwana et al., 2010; Baldwin & Woodard, 2009; Tilson et al., 2010, as cited in Hein et al., 2019); and a sociotechnical perspective, which focuses on the interplay between technology, organizations, and users (de Reuver et al., 2018; Constantinides et al., 2018, as cited in Hein et al., 2019). This threefold categorization forms the basis of my analysis.

This division reflects the role of platforms as technological solutions, as economic mechanisms for value creation and interaction, and as sociotechnical systems where technology and organization shape one another. Furthermore, platforms can also be classified in two ways: either as closed or open to a limited number of firms, or open to an unlimited number of firms (Negoro & Ajiro, 2012). While the literature often refers to platforms as a broad range of systems, including both digital and non-digital, I use the term "digital platform" to specify that the focus is on platforms driven by digital technologies.

2.2 Platform Types

Platforms can serve different functions and roles, and the literature often distinguishes between several types. Some platforms facilitate transactions between actors, while others provide the foundation for innovation and development. In addition, there are hybrid platforms that combine features of different types, specialized data platforms for managing and handling data, and digital platforms that operate within more narrowly defined business domains. The following subsections will present these different platform types in more detail.

Transaction platforms are often referred to as multi-sided markets or exchange platforms and represent a type of platform that functions as a digital intermediary. They facilitate the exchange of goods, services, or information between different actors (Bonina et al., 2021). The platform's purpose is to connect different groups, such as buyers and sellers, employers and job seekers, or drivers and passengers. This connection helps reduce transaction costs and increase market efficiency. Furthermore, transaction platforms can be categorized based on their specific purpose. For example, there are social media platforms (Facebook), e-commerce platforms (Mercado Libre), gig economy platforms (Gojek), and sharing economy platforms (Afristay) (Bonina et al., 2021). What all of these have in common is that they play an important role in the digital economy by structuring interactions between actors and facilitating value creation through connection and exchange.

An innovation platform serves as a foundation on which external actors can develop complementary products, services, or technologies (Gawer, 2009, as cited in Bonina et al., 2021). The platform's technical architecture consists of modules or building blocks that represent available innovative capabilities (Gawer, 2014, as cited in Bonina et al., 2021). These modules allow app developers and other complementors to create new solutions by integrating and further developing the platform's existing functionality. This enables the platform to evolve at a faster pace, as work can be carried out by multiple actors independently of one another. Innovation platforms thus differ from pure transaction platforms in that they not only facilitate exchange between users, but also function as a technological infrastructure that supports innovation and the continued development of the ecosystem (Bonina et al., 2021).

Hybrid platforms are a type of platform that combine aspects of both transaction platforms and innovation platforms. These aspects may involve elements or strategies, and they are integrated either within an ecosystem or within an organization. Such an approach makes it possible to develop a platform type that is more tailored to the needs of organizations or ecosystem actors. The ways in which hybrid platforms emerge can vary. For example, a platform may begin as either an innovation platform or a transaction platform, and due to market establishment and the need for further growth, evolve into a hybrid platform. An innovation platform seeking to better facilitate user interactions and transactions may become more transaction-oriented, while a transaction platform in need of new services may adopt a more modular approach. It is also not uncommon for platforms to start out as hybrids (Cusumano et al., 2019, as cited in Røvde & Snell, 2023).

2.3 Different Perspectives on Digital Platforms

Platforms can be understood from different perspectives, regardless of the type of platform in question. **The technical perspective** emphasizes the platform's architecture, especially its capacity for modularization and integration through the infrastructure, as well as its role in enabling scalability and value-creating interactions among users (Hein et al., 2019). In this context, scalability refers to the platform's ability to maintain performance as the number of users, components, or the volume of data increases (Macri, 2004). Platform architecture is characterized by a core that provides basic functionality and remains relatively stable over time, connected to complementary peripheral components that vary widely (Tushman & Murmann, 1998, as cited in Baldwin & Woodard, 2008).

In the platform context, modularization refers to the process of constructing a complex system from smaller subsystems that can be designed and developed independently yet still function seamlessly together as a whole (Baldwin & Clark., 1997). This approach enables flexibility, scalability, and adaptability, while ensuring stability in the platform's core components. According to Baldwin and Woodard (2008), this design pattern supports both variety and evolvability in the system by limiting the interconnections between components.

Negoro and Ajiro (2012) emphasize the importance of modularization in platform design and describe how this principle provides the foundation for innovation and adaptation within the platform ecosystem, while at the same time ensuring a stable technological core. Furthermore, the platform plays a central role as an integrating middleware. It offers data storage, processing capabilities, and an operating system for applications. In general, the platform functions as a bridge between applications and industrial assets, thereby highlighting its significance as a technological infrastructure (Hodapp et al., 2019; Wortmann & Flüchter, 2015, as cited in Pauli, Fielt, & Matzner, 2021).

The market perspective places greater emphasis on the platform's capacity for value creation. Parker et al. (2016) define the platform as a business model that uses technology to connect people, resources, and organizations within an ecosystem. The primary goal of the platform is to facilitate the generation and exchange of goods, services, and social currency through value-creating interactions. To achieve this, the platform provides an open, participatory infrastructure that enables these interactions, while at the same time establishing rules and governance mechanisms to ensure effective coordination. Ultimately, its purpose is to create connections between users and enable value-creating exchanges for all parties involved.

The sociotechnical perspective combines the system-oriented and a market-oriented view to explain how digital platforms evolve and operate in a broader context. From this perspective, platforms are not seen merely as technological systems or market actors, but as dynamic ecosystems in which technology, organizations, and social mechanisms interact (de Reuver et al., 2018, as cited in Hein et al., 2019). Tiwana (2014) reinforces this view, explaining how platforms combine core technological components and shared infrastructure that provide the basis for application development, thereby fostering ecosystems where innovation and collaboration are driven by contributions from external developers. Platforms can thus be understood as complex systems in which multiple actors and technologies create value through integration and interaction (Simon, 1962, as cited in Tiwana, 2014). By merging these perspectives, the sociotechnical approach offers a more comprehensive understanding of how platforms are shaped by both technological and social mechanisms, and how platform owners must balance competing interests to secure sustainable development and innovation.

2.4 Platform Ecosystem

The sociotechnical perspective serves as the foundation for the concept of a platform ecosystem. A platform ecosystem consists of the platform itself, complementary applications, and the actors who create value through interaction. The ecosystem's complexity stems from interdependent subsystems that are shaped by both technological and market dynamics (Simon, 1962, as cited in Tiwana, 2014). The platform's value is largely shaped by this interplay, which includes end users, competitors, and developers

(Tiwana, 2014). Ecosystems are characterized by multilateral, non-generic complementarities and the absence of hierarchical control. Actors coordinate their activities to create and realize value, and the ecosystem typically emerges around a shared goal or a platform (Jacobides et al., 2018, 2024; Adner, 2017, as cited in Kari et al., 2025). According to Baldwin (2024) additional value is created when autonomous actors collaborate, and coordination occurs through mechanisms such as prices, contracts, negotiations, and open platforms, often in combination. Such systems are particularly suitable when the benefits of coordination outweigh the costs, while distributed control enables flexibility and stronger incentives.

At the structural level, a platform ecosystem consists of three main elements: activities, actors, and architecture (Kapoor, 2018; Adner, 2017, as cited in Hein et al., 2019). The ecosystem's actors can be divided into two main groups: complementors and consumers. Complementors offer complementary products or services that extend the platform's functionality, while consumers are the end users of the platform and contribute to value creation by providing insight into which complementary services are used and how they are utilized (Kapoor, 2018; Lusch & Nambisan, 2015, as cited in Hein et al., 2019).

The architecture of the platform ecosystem explains how technological interactions between providers and demanders of value are organized and can be either platform-based or product-based. The former is characterized by autonomous actors developing complementary solutions built on the platform's infrastructure, while the latter is more closed and centered around a single actor's control over value creation, where the end user interacts directly with a producer without external complementors (Kapoor, 2018, as cited in Hein et al., 2019).

Platform ecosystems are often built in a modular way, with a stable core and a flexible periphery, which facilitates scalability and innovation (Tiwana et al., 2010, as cited in Hein et al., 2019). Through governance mechanisms, platform owners facilitate value-creating interactions among actors (Lusch & Nambisan, 2015; de Reuver et al., 2018, as cited in Hein et al., 2019). In addition, complementors can collaborate independently of the platform owner, which increases generativity and may lead to unexpected innovations (Yoo et al., 2012; Nambisan et al., 2019, as cited in Hein et al., 2019). Generativity can be understood as the capacity to produce unanticipated change, driven by a wide variety of uncoordinated actors (Zittrain, 2005, sitert i Hein et al., 2019). Figure 1 provides a visualization of the structure of a platform ecosystem.

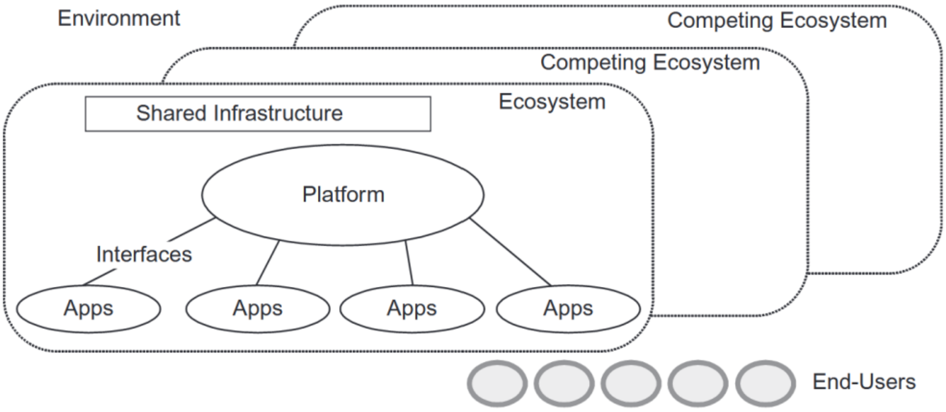

FIGURE 1.1

Elements of a platform ecosystem.

Figure 1: The structure of a platform ecosystem (Tiwana, 2014)

Ecosystems can be classified into different types based on their characteristics. A specialized form of platform ecosystem is the data ecosystem, which has become increasingly significant alongside the digitalization of industries. Data ecosystems represent an organizational structure consisting of data providers and data users who exchange and utilize data for value creation and co-creation. This also includes roles that facilitate and support data exchange among, for instance, infrastructure providers, standardization and certification bodies, and providers of complementary services (Kari et al., 2025). This has also been highlighted in previous studies on the topic, as referenced by Kari et al. (2025), who draw on the works of Jacobides et al. (2018) and Oliveira et al. (2019). Although data ecosystems are not necessarily hierarchically structured, they typically require a coordinating leading actor who defines the shared goal and the guidelines for interaction (Ceccagnoli et al., 2012; Wareham et al., 2014, as cited in Kari et al., 2025).

2.4.1 Platform Governance

Platform governance refers to the ways in which platform owners define and enforce the rules of interaction within the ecosystem, while the ownership model determines the distribution of control and decision-making power among participants. The governance mechanisms of a platform comprise three main dimensions: (1) the allocation of decision rights between the platform owner and complementors, (2) control mechanisms that regulate participation in the ecosystem, and (3) pricing models that determine how the platform's value is distributed. These three dimensions are interdependent, meaning that a choice made in one dimension will affect the others. Misalignment among these dimensions may jeopardize the ecosystem and result in its collapse (Tiwana, 2014).

The ownership of a platform is closely linked to platform governance and influences how control and power distribution within the ecosystem are implemented (Bakos & Katsamakas, 2008; Tiwana et al., 2010, as cited in Hein et al., 2019). The ownership model specifies both who legally owns the platform and how power and control are shared among actors in the ecosystem, depending on whether the structure is centralized or decentralized. It also defines the relationships between partners and how their roles are shaped by the platform's governance mechanisms. The governance of a platform involves mechanisms such as input and output control, that is, who can contribute to the platform (input), how resources are distributed and utilized (output), and how decision rights are allocated. These mechanisms greatly influence the development and dynamics of the platform ecosystem (Tiwana et al. 2010; Tiwana 2014; Hein et al. 2016, as cited in Hein et al., 2019). Research on digital platforms highlights the importance of examining the boundaries between platforms and their ecosystems to understand how the interplay between technological and social mechanisms shapes platform development (Foerderer et al., 2019; Karhu et al., 2018, as cited in Hein et al., 2019).

There are different models of platform ownership depending on the degree of power centralization: (1) centralized under a single platform operator, (2) distributed among multiple actors in a consortium, or (3) decentralized through a peer-to-peer network (Hein et al., 2019).

In centralized digital platform ecosystems, ownership rests with a single owner: the platform owner defines, establishes, and maintains the ecosystem's governance mechanisms. This enables rapid adaptation to support the ecosystem's growth; however, platforms that dominate their markets may exercise such significant power that complementors become excluded. Collaboration with hardware partners may also be reduced. Examples for this platform type include Facebook and Apple iOS (Satariano et al., 2019, as cited in Hein et al., 2019).

Consortium-based digital platform ecosystems are owned and governed by a group of actors who jointly establish governance mechanisms. The consortium model involves a distribution of power among multiple stakeholders who collectively define and maintain governance (Bazarhanova et al., 2019, as cited in Hein et al., 2029). Shared power and collective responsibility require coordination to ensure effective management and continuous co-creation. Such collaborative platforms can be understood as network-organized systems, and the configuration of network governance may give rise to tensions. Networks, for instance, often experience the paradox between efficiency and inclusion. Striking a balance between the need for efficient decision-making and the desire to include a wide range of stakeholders to build legitimacy and trust among network members is crucial (Jones et al., 1997 og Provan & Kenis, 2008, as cited in Kari et al., 2025).

Decentralized digital platform ecosystems are governed by peer-to-peer communities, where users have the opportunity to directly influence the platform's development. Examples include blockchain platforms such as Ethereum and District0x, which enable decentralized ecosystems in which governance is distributed among users (Riasanow et al., 2018, as cited in Hein et al., 2019).

Governance mechanisms such as API's (Application Programming Interfaces) and SDK's (Software Development Kits), function as boundary resources and enables integration and co-creation of complementary products and services. These resources contribute to standardization and coordination while allowing for technological flexibility (Ghazawneh & Henfridsson, 2013; Lusch & Nambisan, 2015, as cited in Hein et al., 2019).

Regardless of organizational structure, a balance between control and autonomy is required, as platform governance shapes the platform's development and dynamics (de Reuver et al., 2018; Ghazawneh & Henfridsson, 2013; Tiwana, 2014; Hein et al., 2016; Foerderer et al., 2019; Karhu et al., 2018, as cited in Hein et al., 2019). An excessive degree of openness may lead to data misuse, privacy violations, and unclear accountability, which in turn can result in reduced control, inconsistent data quality, and increased user dissatisfaction. At the same time, overly strict control can inhibit natural innovation and lead to lower participation willingness and increased frustration within the platform ecosystem (Tiwana, 2014; Lee et al., 2017).

2.4.2 Network Effects

An important element in understanding how platforms grow and attract participants is network effects, also referred to as network externalities. In my study, this concept is relevant because it provides insight into what motivates users and complementors to join a platform, as well as which barriers may hinder participation.

The concept refers to how the number of platform users influences the value creation for each individual user (Parker et al., 2016). To better understand its meaning, it is useful to break it down into two parts: "network" and "externality." According to the Norwegian Academy Dictionary, a network is defined as a group or circle of people, organizations, or companies that are in contact with each other or collaborate on something. The term may also refer to a system of relationships or a collection of entities that are interconnected and form a cohesive system (NAOB: Det Norske Akademis Ordbok, n.d). "Externality," according to the Great Norwegian Encyclopedia, is defined as "the effect an actor's actions have on one or more outsiders, without the actor taking into account how the action affects them." In other words, externalities describe how an action may have positive or negative consequences for others, without these consequences necessarily being intended or considered by the actor performing the action (Onshuus & Idsø, 2024).

When combining these two definitions, "network externality" can be understood as a situation in which a user's actions within a network have an indirect effect on other users, without these actions necessarily being intentional. In this thesis, I use the term *network effects* because it aligns with the literature on digital platforms. To better illustrate how network effects operate, I include the concept of *network externality* in the explanation. In practice, the value of a network for an individual user increases as more users join the platform. The value lies in the user's ability to interact with other users, and this mechanism creates a self-reinforcing growth that lies at the core of network effects (Tiwana, 2014; McGee & Sammut-Bonnici, 2015; Parker et al., 2016).

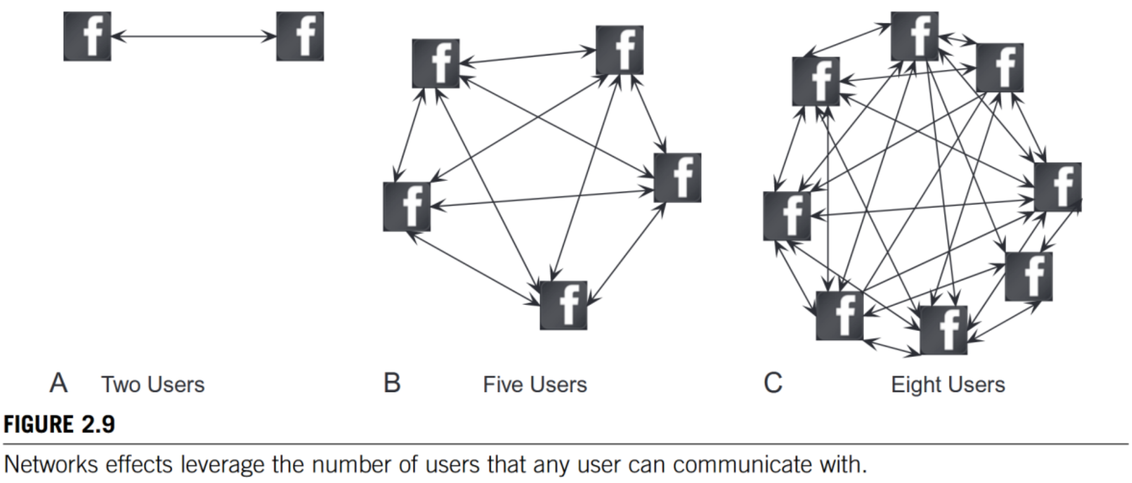

Figure 2: Example of network effect (Tiwana, 2014)

Tiwana (2014) uses Facebook as an example of network effects. A platform without users has no value, as there is no one to interact with. When a new user joins, the value for existing users increases because they now have someone to communicate with. In a network with five users, there are ten possible connections, and with eight users, this number increases to twenty-eight. This illustrates how an increase in quantity also enhances quality in the form of more diverse and relevant connections.

This mechanism functions as a positive feedback loop, where each new user contributes to increased value, attracting even more users and creating a self-reinforcing cycle of exponential growth (Liebowitz and Margolis, 1994, 1998, as cited in Cusumano, 2022; Tiwana, 2014). For this mechanism to take effect, the platform must reach a critical threshold known as the *tipping point*, which requires a minimum number of users. Before reaching this point, platform owners must focus on attracting the initial user base. Once the *tipping point* is reached, the strategic focus shifts toward maintaining the network effects and managing the platform's continued growth (Tiwana, 2014).

Direction refers to whether the network effect is positive or negative. Although network effects are most often associated with increasing value, it is important to consider the potential consequences of negative network effects. In poorly managed platform communities, growth may lead to each new user decreasing the value for others (Parker et al., 2016; Tiwana, 2014). Growth in the number of users enables more relevant and diverse connections between actors such as producers and consumers in a network. At the same time, it can make it more difficult to find the most valuable connections. To avoid this problem, it is crucial that the platform effectively curates content by filtering, moderating, and restricting access, activities, and connections for users. When curation is well-executed, users can easily find links that provide perceived value. Conversely, when curation is poor or absent, users may struggle to identify valuable connections among an abundance of irrelevant alternatives (Parker et al., 2016). After reaching a critical mass of users, a platform can experience both positive and negative network effects at the same time. To ensure the platform's long-term viability, it is essential that the net effect remains positive (Tiwana, 2014).

Sidedness refers to how network effects arise between users or groups on a platform. Do the effects occur on the same side or across sides? The former occurs when adding a user on one side of the platform affects the value for all participants on that same side. From a two-sided market perspective, this refers to how consumers influence other consumers and how producers influence other producers. For example, adding a new Facebook user increases the value for other Facebook users (a positive same-side effect), while adding a new driver on an already congested road reduces the attractiveness for other drivers (a negative same-side effect) (Tiwana, 2014; Belleflamme & Peitz, 2018). Cross-side network effects, on the other hand, occur when adding a participant on one side of the platform increases or decreases the value for all participants on the other side, for instance, the effects consumers have on producers and vice versa. The more people who buy an iPhone, the more developers are motivated to create applications for it (a positive cross-side effect). Conversely, too many low-quality apps can make it harder for users to find good ones, thereby reducing the value for iPhone owners (a negative cross-side effect) (Tiwana, 2014; Parker et al., 2016). Figure 3 illustrates where these network effects occur within the platform.

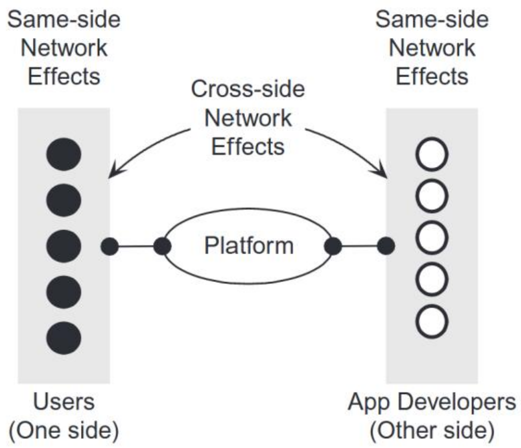

Figure 3: Same-side effect and cross-side effect (Tiwana, 2014)

A platform's sidedness influences how incentives are designed and distributed among the actors on each side of the platform and is therefore closely linked to the value propositions offered to different actor groups. A value proposition describes the measurable value or concrete benefits that a customer gains from using a product or service. It should demonstrate the return on investment or other positive outcomes the customer can expect when choosing one service provider over its competitors (Camlek, 2010).

The value proposition of platforms for platform owners is to enable innovation at a scale that would not have been achievable alone by distributing innovation activities across a broad range of external actors with strong market-based incentives, high motivation, and expertise within narrower domains and market segments. This allows platform owners to focus on their core competencies while delegating innovation costs and risks to third-party developers (Tiwana, 2014).

The value propositions for complementors lie in their ability to leverage the platform's underlying functionality as the foundation for their own solutions. This means that they do not need to allocate resources to develop core functionalities that already exist in other applications and can instead focus their efforts on differentiating their offerings through unique features. In this way, complementors can target niche markets that would otherwise be difficult to enter or sustain commercially. By "piggybacking" of the platform, they gain economies of scale without owning the entire infrastructure and benefit from access to the platform's existing user base, which enhances visibility. The advantages include reduced search and transaction costs (Tiwana, 2014).

The value for end users stems from their ability to tailor their use of the platform to their own needs by combining various applications from the diverse ecosystem. Moreover, the accelerated pace of innovation surrounding the platform provides them, over time, with a greater range of options and the opportunity for more customized solutions (Tiwana, 2014).

A central obstacle in the development of network effects is the **chicken-and-egg problem**. This dilemma arises when the platform's value depends on the simultaneous participation of multiple actor groups, yet neither side is willing to join without the other. Neither party finds the platform or application attractive enough to participate until there is already a significant presence on the opposite side. If the chicken-and-egg problem is not addressed, the platform is bound to fail before it even has a chance to establish itself (Caillaud og Jullien, 2003, as cited in Tiwana, 2014). Baldwin (2024) refers to the same problem as the DMC error (Design–Meet–Commit) and argues that solely relying on market forces is insufficient. Platform owners must actively orchestrate the ecosystem through subsidies, contracts, or other forms of coordination to distribute costs and benefits among the parties. Without such mechanisms, the platform becomes trapped in a strategic vacuum, where all actors wait for someone else to take the initiative.

For user organizations and complementors to join an ecosystem, the perceived value of participation must outweigh the associated costs. The value lies in having a sufficient number of actors on both sides of the platform, which triggers positive network effects for both users and complementors (Tiwana, 2014; Parker et al., 2016; Hein et al., 2019). This means that adoption, including complementors using the resources of the platform in addition to users using the platform and complementary applications, is a prerequisite for value creation to occur, and adoption depends on all actors having their value promises fulfilled.

In digital platform ecosystems, it is essential that technological development occurs in close interaction with the evolution of the ecosystem, meaning that the digital solutions being developed must be considered in relation to actors, incentives, roles, and usage patterns. If technology is developed in isolation, without parallel efforts to mobilize complementors and users, both adoption and network effects will fail to materialize (Tiwana, 2014; Parker et al., 2016; Hein et al., 2019). Markus (2004) highlights that the likelihood of incomplete or poor solutions increases when decisions about new IT systems are not integrated with changes in business processes. This implies that new digitalization initiatives are likely to fail if technology is viewed merely as an IT project or an organizational development effort. Furthermore, anchoring projects in both technology and organizational change is insufficient if these are treated as sequential and separate processes. Markus and Robey (1988) also emphasize the importance of the relationship between IT and organizational change in the context of information systems, dividing the ways in which change occurs through the interaction between IT and organizations into three perspectives: the technological imperative, the organizational imperative, and the emergent imperative.

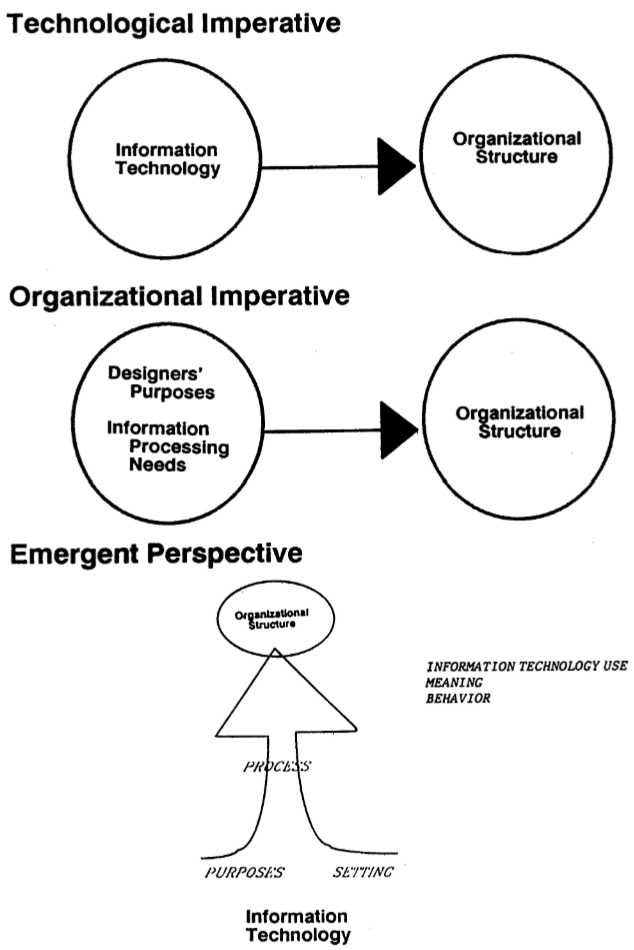

Figure 4: The three perspectives (Markus og Robey, 1988)

The technological imperative views technology as the driving force that either determines or significantly constrains the behaviour of individuals and organizations. Although this perspective has a long history and persuasive claims, empirical research has produced contradictory findings in nearly all areas where computer technology was assumed to have a specific effect (Robey, 1977; Kling, 1980; Attewell & Rule, 1984, as cited in Markus & Robey, 1988).

The organizational imperative asserts that it is people who design information systems to meet the organization's information needs. In this perspective, IT is the dependent variable, shaped by the organization's requirements for information processing and by managerial choices regarding how these needs should be addressed. This imperative, too, has limited empirical support (Markus & Robey, 1988).

Whereas the technological and organizational imperatives explain change as being driven by a single factor and adopt a deterministic view in which one serves as the cause of the other, **the emergent perspective** focuses on how the use and consequences of IT arise unpredictably through complex social interactions. Change therefore involves greater complexity in terms of causality and challenges the idea that organizational change related to IT can be predicted or attributed to a single factor. Understanding such change requires a detailed grasp of dynamic organizational processes, as well as insight into the intentions of actors and the characteristics of the information technology itself (Markus & Robey, 1988).

Because platform ecosystems require a coherent understanding of both technology and organization, adopting an emergent perspective becomes essential. It is only by recognizing that technology, actors, and organizational structures evolve through mutual interaction over time that one can understand and anticipate how digital platforms are adopted and create value. In the context of platforms, the "organization" can be understood as the platform ecosystem itself, consisting of various actors, roles, and relationships, since it is within this interplay that change occurs.

2.5 Data Platforms

A data platform is a type of digital platform, comparable to transaction and innovation platforms. It can be defined as a service that enables the collection, processing, storage, access, analysis, and presentation of data (Petzold, 2019). It differs from other platform types in that it specifically focuses on the technical management and sharing of data through a dedicated technological infrastructure. Data platforms function as distributed marketplaces that facilitate innovation and collaboration among actors. The main participants are data producers, who upload and organize the data, and data consumers, who use the data for various purposes. Within this marketplace, anyone can create stable datasets and build data products to meet a wide range of business needs. This is achieved through a shared technical infrastructure that enables data utilization without physical data movement and ensures robust frameworks for security and access control (Zasadzinski et al., 2021).

Data platforms generate value through the interplay between their technical components and the actors who operate them. This value arises from the breadth of innovation and the reduced innovation costs enabled by the reuse of open data, as well as from the expanding network of participants around the platform, including third-party developers, partners, and users (Danneels et al., 2017).

According to Baldwin (2024), technological value creation depends on how well the different components of a system complement one another. The higher the degree of complementarity, the greater the likelihood that the technology will create value through platform-based ecosystems rather than through standalone firms or closed solutions. In a data platform such as OSDU, it is therefore essential that data, infrastructure, and actors work in concert for the platform's full potential to be realized.

In a data platform, the data itself constitutes the central value-creating resource, either as a product or as a service. A data product can be defined as a goal-oriented product whose primary function is to use data to support a specific business or operational purpose (Zasadzinski et al., 2021). For data to be incorporated into such products, it must first be structured, quality-assured, and prepared for further use. According to Cusumano (2022), data cleansing and curation are essential for a data platform to evolve into a multisided platform enterprise that generates value for multiple actor groups.

2.5.1 Data Governance

Because digital platforms are by definition built on data and information flow, access to structured and reliable information is a fundamental prerequisite for the platform to function. This makes data governance a central aspect of platform operation and development.

In this thesis, I use the term *data governance* to describe the practices and mechanisms that ensure the quality, availability, and security of structured data. This overlaps with what Tallon et al. (2013) refer to as *information governance*, which in the information systems literature is understood as measures aimed at both maximizing the value of information and protecting it from loss and misuse. More specifically, the literature points to two overarching objectives: the first is to maximize the value of information through availability and quality, and the second is to protect its integrity and longevity over time (Khatri & Brown, 2010; Reeg, 2007; Tallon & Scannell, 2007, as cited in Tallon et al., 2013).

Because data platforms are defined as having a technical infrastructure specifically designed for the collection, processing, storage, access, analysis, and presentation of data (Petzold, 2019; Zasadzinski et al., 2021), this means that mechanisms for data governance are integrated into the platform's architecture. When data governance is structurally embedded within a data platform, it cannot be understood solely as a set of technical mechanisms but must also be viewed as strategic priorities that motivate organizations to adopt various information management practices and influence the effects of those practices (Tallon et al., 2013). This is supported by the literature on strategic alignment, which explains how the focus and content of an IT strategy either follow or, in some cases, lead the business strategy. Business strategy, therefore, plays a significant role in IT governance (Henderson & Venkatraman, 1993; Tallon, 2007–08; Tallon, 2011–12, as cited in Tallon, Ramirez & Short, 2013). To conclude, data governance must be aligned with the organization's broader strategic objectives, particularly in environments where data platforms constitute a core component.

2.6 Digital Industry Platforms

The discussion on digital platforms has primarily been associated with consumer markets such as Airbnb and Facebook (Tiwana, 2014; Parker et al., 2016). In these cases, there is typically a single key organization, referred to as a *keystone actor*, that owns the platform and exercises strategic control over both complementors and users (Hein et al., 2020; Tiwana et al., 2010, as cited in Kari et al., 2025).

Platforms in a business context have received less attention. In contrast to earlier platform literature that emphasizes a single leading actor, more recent studies show that the role of platform ownership can also be shared among multiple actors within an interorganizational network. Examples of network-based platforms include European data spaces and OSDU, where governance is carried out through shared ownership and collective decision-making (Gawer, 2014; De Reuver et al., 2018; Hein et al., 2020; Otto & Jarke, 2019, as cited in Kari et al., 2025). In interorganizational networks, three or more autonomous organizations collaborate not only to achieve their own objectives but also to pursue a jointly developed common goal (Provan & Kenis, 2008, as cited in Kari et al., 2025). In practice, this means that the relationships between actors constitute the governance structure itself, giving the platform a different logic from that of hierarchically organized initiatives.

This understanding aligns with what Gawer og Cusumano (2014) define as *industry platforms* (also referred to as *external platforms*), in which one or more firms develop products, technologies, or services that serve as a foundation for external firms. These external firms are organized as a business ecosystem (se også Gawer, 2009; Gawer & Cusumano, 2002).

Digital industry platforms span multiple markets and ecosystems, connecting people and organizations in pursuit of a shared objective, often centered on value creation and profitability (Cusumano, 2022). The purpose of such platforms is to collect and integrate data from industrial assets and leverage this data for the development of smart applications and services. The data may originate from various industrial sources such as machines, tools, vehicles, and factories, and is shared with third-party actors for further development. This enables both innovation and commerce. The platform thus functions both as an infrastructure for value creation and as a distribution channel for complementary solutions (Beverungen et al., 2019; Schermuly et al., 2019, as cited in Pauli et al., 2021).

These platforms are embedded within digital platform ecosystems composed of autonomous firms and individuals, where actions, decisions, and investments are complementary in the sense that the value of the system as a whole exceeds the sum of its individual parts. Such platform ecosystems are described as *metaorganizations*, a structural level above both firms and transactions, where governance occurs through negotiation rather than hierarchy. In this context, coordination through unified management, direct authority, or hierarchical control is not feasible. The main mechanisms for coordinating business ecosystems include (1) prices, (2) bilateral contracts, multilateral negotiations, and system integration, and (3) open platforms. These governance forms can be combined and applied simultaneously within the same ecosystem (Baldwin, 2024).

Baldwin (2024) observes that ecosystems work particularly well in settings that strike a balance between coordination and autonomy, where the need for coordination is substantial enough to justify investments in governance, while decentralized control enables stronger incentives, diverse knowledge, flexible solutions, and broader network effects. Network effects are another key characteristic of industrial platforms. They can occur on the same side, where users on the same side of the platform interact (for example, among producers), or across sides, where the platform connects demand (buyers) with supply (sellers). This mechanism enhances the platform’s value and facilitates growth within the ecosystem (Cusumano, 2022).

Developing and governing a platform ecosystem through collaboration is a demanding process (Bryson et al., 2015, as cited in Kari et al., 2025). While a keystone actor can make decisions independently, network-based platforms require continuous coordination and consensus among equal partners. This makes the emergence of such ecosystems a lengthy and complex process, particularly in the case of industry-wide data spaces (Möller et al., 2024, as cited in Kari et al., 2025). Baldwin (2024) notes that, unlike vertically integrated firms, platform-based ecosystems rely on decentralized governance and therefore require negotiation among autonomous actors with differing goals and interests.

The theories presented form the foundation for understanding digital platforms as both technological and organizational phenomena and are essential for exploring the research question in my study.

3 Sustainability

According to Becker et al. (2016), sustainability is defined as the ability of something to endure. The term is often used in an environmental context, but it is clear that sustainability also requires consideration of environmental resources, individual and societal well-being, economic prosperity, and the long-term viability of technical infrastructure. In software development, sustainability refers to a system’s ability to continue functioning under changing conditions. Key questions that must be addressed include which system is to be maintained, for whom it is intended, over what time period, and at what cost. Five interrelated dimensions are involved: the individual (freedom, dignity, and agency), the social (relationships, communication, and trust), the economic (financial aspects and business value), the technical (system maintenance and adaptability over time), and the environmental (environmental impact and resource management). In the context of my study on the OSDU data platform, the social, economic, and technical dimensions of sustainability are particularly relevant.

Social sustainability is the dimension that encompasses collaboration and communication. It includes, for instance, structures of mutual trust and communication within a social system, as well as the balance between conflicting interests (Becker et al., 2016) In the context of the oil and gas industry, OSDU represents an attempt to establish a common platform for data sharing and technical standardization across companies, disciplines, and IT vendors. Through shared data models, open interfaces, and standardized information flows, OSDU facilitates collaboration that has previously been difficult to achieve in an industry characterized by data silos, proprietary solutions, and low interoperability. The platform thus holds the potential to serve as an infrastructure that supports more sustainable collaboration and fosters long-term partnerships among actors.

Economic sustainability encompasses value creation and cost efficiency. This dimension includes aspects such as capital growth, liquidity, investment considerations, and financial processes (Becker et al., 2016). In theory, the OSDU platform can contribute to greater economic sustainability in the oil and gas industry by improving data access and decision-making, streamlining workflows, and enhancing data quality. In the long term, this can reduce operational costs, free up internal resources, and enable new revenue streams through more flexible and scalable business models.

Technical sustainability concerns the ability to maintain and further develop artificial systems such as software over time. This dimension includes operational performance and innovation, robustness, and the ease with which systems can be adapted and extended (Becker et al., 2016). As a foundational technological solution, OSDU, with its modular platform architecture and open standards, constitutes a central component of the oil and gas industry’s technical sustainability. The way the platform is designed, implemented, and further developed directly influences the industry’s ability to manage and adapt its digital systems over time. The platform is designed for high scalability and flexibility and is, in theory, intended to enable efficient data accessibility, seamless communication between applications, and straightforward system evolution and adaptation over time.

Systemic effects

Many of the critical effects in sociotechnical systems emerge over time. It is therefore important not only to assess a system's immediate functions and outcomes but also its long-term, cumulative, and systemic impacts. These effects can be divided into three categories: immediate, enabling, and structural effects (Becker et al., 2016).

Immediate effects arise directly from the production, use, and replacement of software systems. This includes the direct benefits of the system's functionalities as well as its full life cycle, such as those analyzed in a life cycle assessment, which evaluates the environmental impact of a product from raw material extraction to replacement or recycling (Becker et al., 2016).

Enabling effects stem from the system's use over time and relate to the potential for consuming more or fewer resources, as well as the broader changes caused by its operation (Becker et al., 2016).

Structural effects refer to the enduring changes that can be observed at the macro level. These arise from accumulated micro-level actions and, over time, influence how actors interact, think, and organize. Long-term use of a new software system can, for example, lead to shifts in social norms, policies, and legislation (Becker et al., 2016).

4 Method

In this chapter, I will explain the methodological approach I have used to answer my research question: *"How does the OSDU platform challenge established forms of collaboration and actor roles in the oil and gas industry, and what barriers hinder the development of the ecosystem?"* I will first justify my choice of a qualitative case study as the research approach. I will then outline the chosen research design, which is a cross-sectional study, followed by a description of the data collection method, the implementation of semi-structured in-depth interviews, and the analysis of the collected data. The aim of this chapter is to provide both a description of how the research was conducted and an explanation of why I chose this particular approach. By outlining and justifying the methodological choices, I seek to give the reader a clear understanding of how the data collection was carried out, ensuring that the study can be replicated to produce comparable results to those presented in the results chapter.

4.1 Research Approach and Design

I have conducted an interpretive case study (Walsham, 1995) to explore the research question. In this section, I will first present the rationale for choosing this research approach, followed by an explanation of the research design.

According to Orlikowski og Baroudi (1991), **positivism** is based on the assumption that the phenomena under study contain predefined and stable relationships, which are typically examined through the use of structured and standardized measurement instruments. Furthermore, positivist studies are often characterized by certain indicators, such as the presence of formal propositions, hypothesis testing, quantifiable measurements of variables, and the drawing of inferences about a phenomenon from a sample to a defined population. Klein og Myers (1999) support this definition, noting that research within information systems is often classified as positivist when such elements are present.

Critical research is concerned with uncovering power relations within both society and organizations, where individuals and groups are prevented from realizing their full potential. Its main objective is to provide social critique by highlighting the restrictive and alienating conditions embedded within existing systems (Alvesson & Wilmott, 1992b; Hirschheim & Klein, 1994, as cited in Klein & Myers, 1999). Critical research has an emancipatory purpose, aiming to identify and challenge the sources of domination and alienation, thereby fostering awareness that can enhance the potential for human development. As Orlikowski and Baroudi (1991) note, such studies are characterized by a critical stance toward established assumptions about organizations and information systems, as well as by a dialectical analysis that seeks to uncover the historical, ideological, and contradictory nature of existing social practices.

Interpretive studies are based on the assumption that individuals create and attach their own subjective and intersubjective meanings to their experiences as they interact with the world around them. Interpretive researchers therefore seek to understand phenomena by accessing the meanings held by participants, rejecting the possibility of an "objective" or "fact-based" representation of events and situations. Instead, they pursue a relativistic and shared understanding of phenomena (Orlikowski & Baroudi, 1991). Information systems research can be classified as interpretive when it assumes that our knowledge of reality is obtained only through social constructions such as language, consciousness, shared meanings, documents, tools, and other artifacts (Klein & Myers, 1999). Interpretive research does not predefine independent and dependent variables but focuses instead on the complexity of human sense-making as situations unfold (Orlikowski & Baroudi, 1991). The goal is to develop an understanding of the context in which an information system is embedded, as well as the processes through which the system both influences and is influenced by that context (Walsham, 1995).

In this study, I have chosen to adopt an interpretive paradigm. This choice is based on both the purpose of the study and the nature of the research question. The positivist framework, which aims to test hypotheses, develop generalizable theories, or identify cause–effect relationships, is not suited to this study, as the objective is not to test hypotheses or generalize findings but to gain insight into how actors understand and experience the development of the OSDU data platform within their specific context. Similarly, the critical paradigm is less appropriate here, since the aim is not to conduct a societal critique or uncover power structures and ideological dominance.

My understanding of the research problem is that there is currently limited research on how actor roles, collaboration, and industry structures are affected when an industry historically characterized by proprietary IT systems, vertical integration, and stable actor positions attempts to implement an open, platform-based approach such as OSDU. This is a complex process shaped by diverse perspectives and experiences, which makes the interpretive paradigm particularly suitable, as it centers on human sense-making in relation to technology and organization. I aim to understand how actors involved in this transformation perceive and interpret technological and organizational change. An interpretive framework allows for an in-depth exploration of such processes through a context-sensitive and open-ended analysis, making it possible to capture nuances and insights into how information systems such as the OSDU data platform both influence and are shaped by social and organizational environments.

4.1.1 Research Design

I have chosen to examine how the OSDU data platform challenges established forms of collaboration and actor roles within the oil and gas industry through a case study. A case study is described as an exploratory, in-depth investigation of a research problem in which people, events, decisions, institutions, and social systems are studied to illuminate a phenomenon. In case studies, the investigation is limited to a small number of cases that are explored in depth. As a research method, it represents a flexible and empirical approach that is well suited for exploring complex phenomena within their real-life context (Yin, 2009; Berg, 2009; Kamper, 2004, as cited in Muzari et al., 2022). This aligns with my research question, as I seek to understand how OSDU unfolds in practice. Because the phenomenon is examined in depth and explored through people's experiences with OSDU, I therefore consider the case study to be the most appropriate approach.

In research, there are two main methodological approaches: quantitative and qualitative. The quantitative approach typically begins with a specific theory, either proposed or previously developed, which then leads to concrete hypotheses that are measured quantitatively, analyzed, and evaluated according to established research procedures. This method is particularly suitable when studying large groups of people and for generalizing findings from a sample to broader populations (Swanson & Holton, 2005). Since my study focuses on a smaller group of participants and does not aim to test specific theories through concrete hypotheses, the quantitative approach is therefore not appropriate for this research.

The qualitative research approach is grounded in the interpretive paradigm, which, as previously mentioned, assumes that knowledge is subjective because it is shaped by individuals' interpretations of the world around them. This means that understanding depends on individual perspectives, creating a need for deep and detailed descriptions and explanations of the phenomenon under study. The qualitative approach allows for the collection of rich, detailed accounts based on participants' perspectives. This ability to gather data through in-depth engagement with participants makes it particularly valuable. The data generated are both descriptive and subjective, as they take the form of words and reflect underlying perceptions, opinions, motivations, and emotions of people within a given context. Because this approach focuses on how understanding is constructed, how meaning is communicated, and how roles are shaped, it is more concerned with processes than with outcomes (Zireva, 2013, as cited in Muzari et al., 2022). This approach is well suited to exploring complex and context-dependent phenomena that cannot easily be quantified, such as actors' experiences, judgments, and perceptions related to digital transformation and the adoption of platform-based ecosystems. Since my research question seeks to explore how transitional processes are experienced and managed from different perspectives, the study requires a method that allows for nuanced, in-depth, and contextually grounded descriptions. Therefore, the qualitative research approach is highly appropriate for this study.

Denzin and Lincoln (2000), as cited in Muzari et al. (2022) emphasize that qualitative research achieves credibility through reliability. Reliability enables quality control and the assessment of the accuracy of the information collected from participants. Credibility refers to the truthfulness of the findings and is grounded in participants' environmental and cultural contexts. The degree of confirmability in a study reflects the establishment of verifiable, direct evidence based on the researcher's experiences with participants. Transferability concerns the extent to which the findings can be applied to similar situations, conditions, or contexts. These evaluation criteria are essential in qualitative studies to ensure a sufficient level of reliability (Mohajan, 2018, as cited in Muzari et al., 2022). Triangulation, or crystallization of data, is one of several ways to strengthen a study's reliability. It involves using multiple researchers, sources, and methods to compare findings across different perspectives. This process reduces the risk of drawing biased conclusions by gathering information from a wide range of individuals, teams, and settings, as well as through the use of diverse data sources. Another measure is *member checking*, in which data and results are verified by participants other than those originally involved. Peer review, where colleagues or fellow researchers provide feedback and assess the study's quality, can also enhance reliability (Lune & Berg, 2017, as cited in Muzari et al., 2022). In this study, I applied triangulation by collecting data from multiple organizations and professionals in different roles to ensure the reliability of the findings. In addition to triangulation across organizations and actor roles, I also incorporated elements of *member checking* during the interviews. This was done by presenting selected statements from earlier participants to later informants, allowing me to explore their reactions, reflections, and assessments. This approach made it possible to validate, nuance, or challenge my understanding of key themes in the study, thereby strengthening its reliability. Furthermore, I received academic feedback and critical supervision from my advisor, who is an experienced researcher. This process contributed to a higher level of reflection and quality in my methodological choices and interpretations, serving as a form of peer review.

Cross-sectional studies are characterized by the collection of relevant data from a population at a specific point in time. This means that such studies do not follow individuals over a period but instead provide a snapshot of the phenomenon being studied. Consequently, cross-sectional studies lack a temporal dimension, as all data refer to the time or period during which the data were collected. What constitutes a "specific point in time" is not precisely defined, and the timeframe can therefore vary depending on the research question. These studies are generally less resource-intensive and relatively easy to conduct (Wang & Cheng, 2020; Kesmodel, 2018). Although the term *cross-sectional* is most commonly used in quantitative research, particularly within medical fields, I apply it here to describe that my data collection was carried out within a clearly defined period and that the study does not include a longitudinal perspective tracking developments over time. In this qualitative case study, the term is used to clarify that the aim was to capture the participants' experiences and perspectives as they appeared at a specific point in time.

4.1.2 Data Collection Method

I have chosen to use semi-structured interviews as the primary method for data collection in this qualitative research approach. Interviews are widely regarded as the most common and traditional method for collecting and generating data in qualitative research (Muzari et al., 2022). Hoberg (2001), as cited in Muzari et al. (2022), defines an interview as a dialogue between two individuals, one being the interviewee, often referred to as the informant, and the other the interviewer. The interviewer initiates the conversation with the goal of obtaining information relevant to the research topic. This method generates data through direct verbal interaction, where the data take the form of verbatim quotations from participants. As such, interviews represent a direct approach to collecting insights about participants' thoughts and experiences (Trochim, 2006, as cited in Muzari et al., 2022). Given that my study follows an interpretive paradigm and employs a qualitative methodology, interviews are the most suitable method for gathering participants' perspectives, experiences, and opinions. The interviews were conducted using an interview guide, which served as the main research instrument. The guide included a set of open-ended questions designed to capture participants' views, emotions, and reflections on specific topics relevant to the study.

There are three main types of interviews: structured, semi-structured, and unstructured. In **structured interviews**, the interviewer controls both the tone and pace of the interview and asks all participants the same set of questions. This type of interview allows the content and procedure to be organized in advance, with careful planning of details such as question wording and sequencing (Mathers et al., 2002, as cited in Muzari et al., 2022).

In **semi-structured interviews**, the interviewer asks open-ended questions based on predefined themes they wish to explore. If a participant struggles to answer a question, seeks clarification, or responds briefly, the interviewer can use prompts or follow-up questions to encourage further reflection. The interviewer may also ask participants to elaborate on their initial responses or expand on ideas they have introduced themselves. This format is particularly useful when exploring attitudes, perceptions, or experiences in areas where little prior research exists (Mathers et al., 2002; Libarkin & Kurdziel, 2002, as cited in Muzari et al., 2022).

Unstructured interviews, also known as in-depth or open interviews, are highly flexible and have little to no predefined structure. The interviewer exercises minimal control, giving participants the freedom to guide the conversation. However, this approach carries the risk that discussions may drift off-topic, potentially leading to an interview that lacks focus and direction (Zireva, 2013, as cited in Muzari et al., 2022).

Based on my prior knowledge of the oil and gas industry and my experience with interviews as a method of data collection, the semi-structured interview format was deemed the most suitable for this study. I lack extensive experience and detailed knowledge of the OSDU data platform's functionality and the operational dynamics of the oil and gas industry. This makes it challenging to anticipate all relevant questions in advance. Furthermore, the informants possess significantly more expertise on the topic than I do. To collect data that best addresses my research question, it was important to allow participants to guide the conversation to some extent and to introduce themes they considered relevant for exploration. For this reason, a structured interview format would not have been appropriate, as it could have restricted both the depth and flexibility of the discussion. On the other hand, an unstructured interview approach would have been too open-ended and unfocused, making it difficult to compare responses or ensure that all central topics were covered. Conducting such interviews effectively would likely require a highly experienced interviewer, which I do not consider myself to be. After assessing my own experience and the study's requirements, I therefore chose the semi-structured model because it offers a balance between structure and openness. This approach allows for in-depth insights while maintaining alignment with the research question. It is particularly well suited for a study where participants' professional knowledge and experiences are central to exploring a complex and relatively under-researched phenomenon.

4.2 Data Collection Process

When conducting my case study, I began by performing a literature review prior to carrying out the semi-structured interviews with informants. The review provided a stronger theoretical foundation for understanding platforms and platform ecosystems, as well as for identifying key themes to prioritize when developing the interview guide. Since digital platform ecosystems in an industrial context remain a relatively underexplored area, I chose to examine the transition from traditional vertical or linear structures to platform-based ecosystems. In selecting informants, I focused on actors who were either directly involved in OSDU or part of the subsurface domain within various companies in the Norwegian oil and gas industry.

4.2.1 Conducting the Interviews

For this study, I used the semi-structured interview format. As explained in Chapter 4.1.2 Method of Data Collection, I wanted the interviews to maintain a degree of openness so that the informants would not feel constrained by my questions but could introduce topics they found relevant. My knowledge of OSDU was also limited at the outset, and the semi-structured format made it easier to uncover insights I did not initially know I needed. This approach also allowed informants to clarify or correct any potential misunderstandings and enabled me to follow up on interesting themes that emerged during the conversations. The interviews therefore took on a conversational tone, which likely helped participants feel more at ease and encouraged more open and reflective responses. I prepared an interview guide in advance of each session; however, since the discussions flowed naturally, I chose to use the guide primarily as support rather than a strict framework. When informants brought up topics beyond the guide, I followed up with improvised questions to explore them in greater depth. In total, I conducted twelve interviews with twelve informants who were either directly involved with OSDU or had experience working within the subsurface domain of the oil and gas industry.

Table 1: List of Interview Participants

Informant:	Job role:	Company type:
1	Digital Technology Consultant	Large operator
2	Data Management Specialist	Large operator
3	Senior Advisor, Petrophysics & Subsurface Data	Large operator
4	CTO Advisor, Energy & Resources	Cloud provider
5	Senior Data Platform Architect / Product Owner – OSDU	Large operator
6	Subsurface Data Manager	Large operator
7	Geologist	Large operator
8	Advanced Technical Architect, Data Delivery	Large operator
9	Exploration Geophysicist	Small operator
10	Various Roles – Geodata & Systems	Software provider
11	Data Support Role – Loading Metadata to OSDU	Large operator
12	Senior Geologist / Former Subsurface IT Lead	Large operator

The informants were selected by my main industry contact person for the thesis. Based on preliminary discussions, individuals with backgrounds relevant to the research question were approached. This recruitment strategy can be described as a snowball method, a form of convenience sampling used when it is difficult to access participants with specific characteristics. In such cases, existing participants recruit new ones from within their own professional networks (Naderifar et al., 2017).

The interviews were conducted digitally, either via Microsoft Teams or by phone, as the informants were geographically dispersed, making in-person meetings impractical. To ensure a more representative data foundation, I included participants with varying levels of involvement in OSDU. The sample consisted of actors from different positions within the OSDU platform ecosystem, including representatives from operator companies, a software provider, and a cloud service provider.

All interviews were conducted by me alone. Prior to each session, participants received a consent form, and all conversations were recorded with their permission. The interviews lasted between 45 and 60 minutes, depending on the number of follow-up questions and the amount of additional information provided outside the interview guide. The recordings served as the basis for transcription and subsequent analysis, as it is recommended that all interview participants have their voices recorded and transcribed into datasets to ensure analytical consistency. The datasets and audio recordings were stored securely and kept available for verification or evaluation if requested, in order to maintain the study's reliability (Lune & Berg, 2017, as cited in Muzari et al., 2022).

The study initially focused on actors from operator companies, as they play a central role in the implementation and strategic use of OSDU. During the research process, it became evident that the IT vendor perspective is also crucial for understanding the dynamics of the platform ecosystem. Although I gained some insights through a few representatives from other actor groups, I recognize in retrospect that a broader representation could have strengthened the understanding of interaction, friction, and differing incentives within the ecosystem. The limited access to IT vendors and cloud providers therefore represents a limitation of this study and a potential area for future research.

In the preparatory phase of my research, the project had a different focus, which I later revised as the work progressed. Initially, I intended to examine how OSDU contributes to interoperability and what prerequisites are necessary for its adoption within the subsurface domain. However, after conducting the first interviews and engaging in discussions with my contact person, it became clear that OSDU is not directly used by professionals in subsurface disciplines. The platform primarily functions as a backend solution that supports existing and new application tools, rather than serving as a tool itself for geologists, geophysicists, or petrophysicists. Based on this insight, it was deemed less meaningful to investigate the factors influencing OSDU adoption specifically within the subsurface domain. The interview guide was therefore adjusted to include a broader range of roles within the OSDU ecosystem, such as data managers, IT specialists, client consultants, and project managers. The questions were reformulated to be more open and focused on the informants' experiences with the development, implementation, and use of OSDU, rather than on specific workflows related to subsurface data. An example of such a revision was the question: *"What do you think could be a way to ensure that OSDU will be adopted in the subsurface domain?"*, which was replaced with *"Based on your experience, what do you think are the key prerequisites for OSDU to be widely adopted in the oil and gas industry?"* This change allowed for more nuanced and relevant responses, enabling informants to answer from the perspective of their own roles and experiences. In practice, the interview guide was used as a flexible framework, and questions that were not relevant to a given informant were omitted. Since the interviews were conducted in a conversational format and I had already developed a strong thematic overview, necessary adjustments were made spontaneously during the discussions without rewriting the guide itself.

4.2.2 Ethical Considerations

Concerns related to research ethics involve key issues such as harm, consent, privacy, and the confidentiality of data (Lune & Berg, 2017, as cited in Muzari et al., 2022). Ethical considerations are intended to protect participants' privacy and to respect their dignity and perspectives, particularly in interviews where sensitive topics may arise (Clough & Nutbrown, 2012; Sullivan & Sargeant, 2011, as cited in Muzari et al., 2022). Since my interviews could potentially include criticism of existing industry practices or of the actions and involvement of specific actors, I considered these to be topics with a certain degree of sensitivity. Consequently, all information that could identify individual participants or organizations has been anonymized. This included the anonymization of company names and detailed job titles to ensure that informants could not be recognized by external parties. Conducting data collection for this study in an ethical and responsible manner has been a top priority. This includes safeguarding participants' rights and ensuring confidentiality, voluntariness, and informed consent. According to Sullivan and Sargeant (2011, as cited in Muzari et al., 2022), participants' consent to take part in a study is of great importance, and if they choose to withdraw at any point, that decision must be respected without reservation. Participants should be given sufficient time to review the information sheet and consent form and to provide their informed consent voluntarily. In my research, I adhered to these principles and prioritized transparency in all interactions with informants. They were informed about the study's purpose, how their contributions would be used, and their rights as participants in a research project. Prior to the interviews, all informants received an information sheet and consent form clearly stating that participation was voluntary and that they could withdraw their consent at any time without providing a reason. They were also informed of their rights to access and delete personal data, as well as how the collected information would be used within the project. I submitted the project for review to Sikt: Norwegian Agency for Shared Services in Education and Research and obtained approval for both the consent form and information sheet before commencing the study. This ensured that all ethical and data protection requirements were met. Furthermore, it was essential to handle personal data confidentially and in compliance with current regulations. Audio recordings from the interviews were stored locally in accordance with NTNU's guidelines, and all transcribed material was stored in a restricted-access area on NTNU's secure servers.

4.3 Data Analysis Process

In this chapter, I present how I processed and analyzed the data collected from the conducted interviews to ensure that the study's results can be verified retrospectively. The purpose of the data analysis is to gain a deeper understanding of the collected material and to organize the findings in a way that makes it easier to identify patterns, relationships, and themes relevant to answering the research question. Lune and Berg (2017, as cited in Muzari et al., 2022) describe analysis as a reasoning strategy used to break down a complex whole into smaller parts to better understand the relationships between them. Mouton (as cited in Zireva, 2013, and referenced in Muzari et al., 2022) supports this view, emphasizing that data analysis involves breaking down the material into manageable themes, patterns, trends, and relationships. The goal of analysis, therefore, is to understand the different components of the overall data, examine the relationships between concepts, and identify recurring patterns or tendencies that can form the basis for thematic categorization (Muzari et al., 2022). Mohajan, as referenced in Muzari et al. (2022), points out that patterns in data reflect recurring behaviours. They further explain that data generation and data analysis often occur in parallel in qualitative research. This aligns with how I conducted my work, as I carried out interviews and performed inductive coding simultaneously throughout the process.

4.3.1 Data Processing

To facilitate the analysis, I transcribed all interviews after the data collection, as described in Chapter 4.2.1, Conducting Interviews. I used a transcription tool provided by NTNU to ensure proper data handling. Since the informants did not share highly sensitive information, such as personal health data, I considered this tool appropriate for my study. After the automatic transcription, I manually reviewed the material to ensure accuracy. This process involved removing repetitions, correcting transcription errors, and anonymizing content where company names or other identifiable information appeared. Transcribing the interviews made it possible to preserve the informants' original expressions and linguistic nuances, which was essential for ensuring that the analysis was based on their actual statements and perspectives. This process contributed to enhancing both the reliability and transparency of the subsequent analysis.

4.3.2 Data Analysis

The analysis of the collected data followed an interpretive qualitative research approach, using an inductive strategy for data analysis. When analyzing qualitative data, one may apply either a deductive or an inductive approach. The deductive approach involves analyzing data based on a predefined framework and an expectation that certain key themes will appear in the material (Bradley et al., 2007; Braun & Clarke, 2006; Burnard et al., 2008; Miles & Huberman, 1994; Thomas, 2003, as cited in Azungah, 2018). However, key themes can sometimes become hidden, reshaped, or omitted due to pre-established assumptions embedded in data collection and analysis procedures, which are more common in experimental and hypothesis-testing research (Thomas, 2003).

In the inductive approach, the goal is to allow research findings to emerge from the frequent, dominant, or significant themes found in the raw data without the constraints imposed by structured methodologies. Although the findings are influenced by the researcher's objectives or guiding questions, they arise directly from the analysis of the raw material rather than from predefined expectations or theoretical models (Thomas, 2006, as cited in Azungah, 2018). My research is exploratory in nature, focusing on emerging themes rather than on testing existing theories. The natural emergence of insights from the data aligns better with my research question. When developing a general inductive approach, it is important to keep three main principles in mind: to condense extensive and varied raw text data into a concise and summarized form, to establish clear connections between the research questions and the summarized findings derived from the data, and to ensure that these connections are both transparent (traceable to others) and defensible (justified by the study's purpose). Finally, the analysis should aim to construct a model or conceptual understanding of the underlying structure of experiences or processes identified in the raw data (Thomas, 2003).

I used the digital analysis tool NVivo for the qualitative analysis to structure and organize the coding of the data material. NVivo was chosen because NTNU provides a free license and recognizes it as a reliable and approved tool for qualitative research. The analysis followed an inductive approach, where the codes emerged from the raw data without predefined categories. I systematically reviewed each sequence of statements in the transcripts and created codes that summarized the essence of what was expressed. Throughout the process, I continuously evaluated whether some codes overlapped or related to existing ones. If a new code partially overlapped with another but had a more specific meaning, it was created as a subcode. When several codes covered related themes, they were merged into broader categories. Conversely, broader codes were sometimes divided into more specific subcodes when the content variation justified it. This iterative and flexible process allowed the coding framework to evolve in line with the data, helping to clarify patterns, relationships, and thematic structures within the material. Whenever I needed to justify my reasoning about statements or frequencies that could be interpreted differently, I wrote memos to document my reflections. Once the codes were established and organized into overarching and subordinate categories, I began identifying patterns, connections, and recurring themes in the material. These findings are presented in Chapter 5: Results.

5 Results

This chapter presents the findings from the qualitative case study of the OSDU data platform in the Norwegian oil and gas industry. The interviews reveal a misalignment between the operators' strategic focus and what is required to realize the potential benefits of OSDU. Operators primarily perceive the platform as an internal technology implementation project, while the actual value depends on broader, industry-level transformations. To achieve these gains, OSDU must function as a platform ecosystem in which different types of organizations assume complementary roles and responsibilities. A key requirement is the participation of IT vendors, who act as complementors by creating added value through integrating and enabling subsurface data within OSDU. However, this participation remains limited. As a result, the organizations that were meant to form part of OSDU's platform ecosystem have become trapped in a strategic deadlock: a situation characterized by mutual waiting, lack of leadership, and the absence of clear incentives and accountability. This has effectively stalled collective progress across the ecosystem.

The chapter is structured to illustrate how this strategic deadlock has emerged. It begins by analyzing how the operators' technological focus and their perception of OSDU as a purely technology-driven project shape both language and understanding, thereby creating a disconnect between those involved in developing the data platform and decision-makers in leadership positions. Next, the analysis highlights how the lack of strategic anchoring weakens ownership of the platform and leaves ambiguity regarding responsibilities within the ecosystem. When roles and mandates are not clearly defined, a power vacuum arises. The operators have filled this vacuum by taking greater control over both the data and the technological development of OSDU. At the same time, the traditional position of IT vendors, previously based on proprietary solutions and control over data access, has been diminished. This has led to a shift in the balance of power, where operators' influence has grown while IT vendors increasingly struggle to identify sustainable business opportunities within the new platform logic. As a result, their motivation to contribute and participate in the further development of the ecosystem has declined. Together, these themes form the foundation for understanding how the strategic deadlock has taken shape and which underlying mechanisms currently hinder OSDU's progression into a fully functional platform ecosystem.

5.1 OSDU Understood As A Technology Implementation Project

OSDU is often treated as an isolated technology project rather than a strategic initiative, particularly by representatives from the larger operating companies. The focus is primarily on internal operational processes and technical implementation, while the recognition that platform adoption entails changes in coordination, collaboration, and value creation across actors is largely overlooked. In other words, there is a tendency to interpret OSDU within existing technical frameworks rather than as a shift toward a platform logic that requires a shared strategy and direction. As a result, technology drives change without being anchored in an overarching strategic framework.

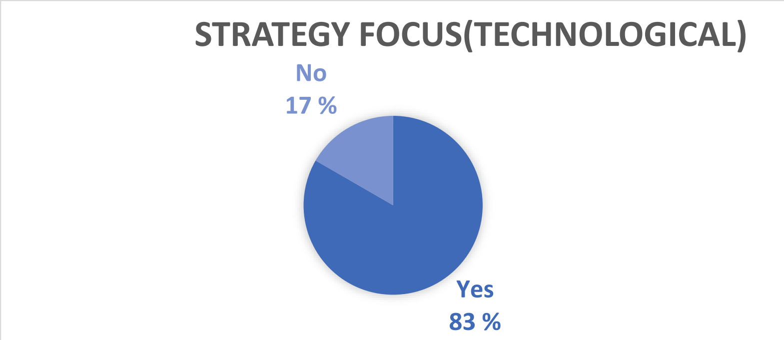

Figure 4: Own illustration: The degree of technological focus amongst the informants

Figure 4 shows the proportion of informants (in percent) who describe OSDU as a technology project: a clear majority (83%) characterize the platform primarily in technological or operational terms. This technical focus shapes both the discussions about what OSDU is and what is required to make it work. Although some acknowledge the need for strategic anchoring, their reflections typically concern securing management support for internal technology implementation rather than establishing a collective direction or shared adaptation to a new platform logic.

The dominant technological orientation is evident in how informants emphasize topics such as interoperability (5.1.1), data governance (5.1.2), and technical standardization challenges (5.1.3). This focus also influences how OSDU is communicated to management, as discussed further in section 5.2, which shows how the use of technical language can be alienating and weaken strategic alignment.

5.1.1 Interoperability As A Technical Challenge

Several informants emphasize that interoperability between applications and systems has been and, continues to be the key challenge that must be resolved for OSDU to succeed. They describe OSDU as a technical connector designed to ensure seamless communication between different systems and applications. At the same time, they express frustration that achieving technical interoperability in practice remains difficult: even basic interoperability cannot be achieved without close dialogue between IT vendors, despite OSDU being intended to serve as an intermediary layer. This frustration is not only related to technical errors but also to the platform's immaturity, as seamless coordination between systems has yet to be realized. The goal is for OSDU to enable data sharing without the need for manual coordination between various applications and IT vendors. However, when direct contact between developers is still required for the system to function, the goal appears unattained. One informant described how an interoperability test failed when one application was unable to read data written by another:

> «In this case, it more or less collapsed. We had to go back and actually start talking to both developers for both applications. »

Another informant points out that interoperability is not only an internal challenge, but also a widespread issue across multiple industry actors. The statement reflects a broader understanding of the difficulties associated with data sharing and the need for collaboration and data exchange at the industry level. Nevertheless, the understanding remains primarily technical: data sharing is seen as difficult because the systems do not function well enough, rather than because of a lack of shared direction, trust, or adequate conditions for communication and collaboration. This suggests that even when informants recognize that the challenge extends beyond individual systems, OSDU is still predominantly described as a technological implementation:

> «Everyone has different challenges with data exchange, whether internally, between groups, or with other companies. So, for example, if you have many partners and need to share data with them, there are challenges involved. »

These statements illustrate how one of the platform's core ambitions which is to facilitate efficient and standardized data sharing largely remains unrealized. At the same time, they show that many participants still view the issue mainly from an internal and technical perspective, with limited reflection on broader organizational or collaborative dimensions. According to several informants, the further development of the platform should therefore focus primarily on improving this functionality.

5.1.2 Limited Understanding Of Data Governance: Techincal And Internal Orientation

Although data governance in OSDU is often understood as technical mechanisms such as access control, storage, quality assurance and data cleaning, it also represents an essential part of overall platform governance. This is because the data platform is designed to standardize and share data across industry actors. In this context, data governance must be viewed as more than a purely technical function, as it forms part of the broader governance structure that enables the platform to operate as a shared solution for the entire ecosystem.

The informants largely focus on the technical and operational aspects of data governance, particularly the need for clear procedures for access control, storage, quality assurance and data management. Given their professional roles and responsibilities, this emphasis is understandable. However, the strategic dimension of data governance, which concerns the overall governance of the platform, receives little attention. This suggests that informants either do not perceive the connection between data governance and the platform's overarching governance or that this aspect is not prioritized in practice.

This technical focus also shapes how the informants describe data governance in practice. Security and access control are highlighted as key areas and are mainly discussed as control mechanisms that define who can access data and under what conditions. When they talk about license handling and access rights, the attention is primarily directed toward the company's own data and internal processes, while issues of cross-organizational access and governance within the broader industry context are largely absent:

> «We have to ensure that security is tied to the data itself. Who can see and access the data we have, there are strict rules in licenses and so on. There are different regulations for who can gain access, how to apply for it, and things like that. »

This technical focus on data governance is further illustrated by another example, where an informant points to the lack of routines for cleaning up and preserving existing data. Here too, the reflection concerns internal challenges, in this case data quality and structure within the company, with an emphasis on specific technical functions for internal order and file management. As in the previous quote, there is little discussion about how data governance should function across organizational boundaries, even though this is essential for OSDU to operate as an industry-wide platform. The quote reinforces the impression that good data governance is primarily understood as the establishment of technical mechanisms serving as internal control routines:

> «There is also a task related to governance, the governing documents concerning data management. What should be retained, what should not be retained, how long temporary versions can remain, and which procedures apply when a person leaves the company. (…) We don't really have proper cleanup procedures to remove all the temporary data that person left in the company, for example. (…) No one dares to delete what's there because they don't know what it is, and that's often the problem with cleanup. »

Overall, the findings suggest a pattern where there is only a partial understanding of what data governance entails in a platform context. The focus on internal technical control mechanisms overshadows the strategic dimension, which serves as the crucial link between internal data management and external coordination within the OSDU platform ecosystem.

5.1.3 Standardization Challenges As A Technical Problem

The informants primarily describe standardization challenges as technical problems, yet the varying use of OSDU standards points to a deeper need for coordination and consensus at the industry level. Several informants emphasize issues related to data models, schemas, and metadata. They describe the platform's definitions as overly flexible, allowing for divergent interpretations and implementations across companies and applications. As a result, multiple versions of the standard emerge, which undermines interoperability and creates uncertainty, particularly for IT vendors attempting to build compatible solutions.

Many informants explain that the flexible schemas provide little guidance on what should actually be filled in. This makes it difficult for actors to know what data and metadata to expect and what to base their work on within the platform. The challenge is therefore not solely about technical standardization but also about the lack of shared understanding and coordination among ecosystem participants. When IT vendors and operators are free to interpret the standards differently, "dialects" emerge: interpretations that are related but not identical. This variation poses significant problems for interoperability and undermines the very purpose of having a common model. One informant explains:

> «Part of the challenge is that the OSDU schema definitions are relatively flexible and don't provide very strong guidelines for what should actually be populated. That leaves room for interpretation, and it becomes difficult to know what to build into OSDU support. What metadata attributes can you expect to be populated? It's a continuous challenge. »

The standardization challenges illustrate how the prevailing technological focus has led to a lack of coordination among actors. The open and flexible data model, originally intended to enable broad use and adaptability has, in practice, resulted in significant variation in implementation. This variation makes it difficult to achieve a shared understanding and seamless integration between applications and actors, creating alignment problems across the ecosystem.

Currently, there are no mechanisms, such as data certification, to support harmonization and coordination across organizations. Such a mechanism could help clarify what constitutes the "correct" use of OSDU, and the absence of this clarity has tangible consequences for the platform's ability to function as a shared infrastructure for collaboration in the industry. One informant describes the issue as follows:

> «A major challenge arises if many applications start connecting to OSDU. Will they all use OSDU in the same way? Since it's such a rich data model, there's room for different companies to use it somewhat differently. Will they use it consistently? And there's no certification to verify whether OSDU has been used correctly. (…) So, I think the big challenge is to align how OSDU is used. »

Difficulties with interoperability, limited emphasis on the strategic dimension of data governance, and ongoing standardization challenges highlight how a one-dimensional, technical understanding of OSDU constrains its development as a shared industry solution.

An exception in the data is one informant who, despite maintaining a strong technical focus throughout the interview, notes that technological development and OSDU in particular, can drive organizational change. This informant describes how the logic of the platform challenges existing structures and underscores the close interconnection between organization and technology:

> «I think it's very clear that the way oil companies are organized is closely linked to how their applications are structured. »

At the same time, the informant emphasizes that it is primarily technology that drives change:

> «I would say it's more about technological development than organizational development. I think organizational change follows from new technology: it creates new possibilities and new ways to organize or solve things. »

Here, technological development is viewed as the primary driver of change, with organizational adaptation seen as a reactive process. This mindset assumes that organizational structures will adjust naturally as technology evolves, without requiring deliberate strategic planning or restructuring in advance. However, assuming that organizational change will occur intuitively risks underestimating or neglecting essential measures such as clarifying responsibilities, establishing shared data governance, or developing common goals. If organizations fail to adapt in time to leverage the opportunities brought by new technology, value realization may be reduced. In practice, this can result in a technically sound solution that lacks integration with operational practices, and consequently, is not adopted as intended.

This perspective, where technology is seen as the main driver and organizational change is expected to follow, is reflected in how OSDU is discussed more broadly. The next section examines how this technological focus shapes the language and understanding of the platform across different professional domains.

5.2 OSDU Described Through Technical Language

Several informants describe how the dominant role of the technical community in the development of OSDU influences both the language and the overall understanding of the platform as a digital solution. The platform itself is characterized by a high degree of complexity, both in terms of its terminology and its developmental history, and the technical vocabulary established during its development has carried over into its commercialization. As a result, the vocabulary and logic shaped by the perspectives of technologists have become embedded in business and strategic discussions, where the technical terminology does not necessarily translate into concepts understood by the business side. Moreover, technologists and business stakeholders do not share the same perspectives. This creates communication challenges and uncertainty about what OSDU actually is and what value it offers. The gap between those developing the platform and those expected to use it strategically contributes to linguistic and cultural barriers, both within organizations and across the wider industry. One informant expressed it this way:

> "You almost need a bachelor's degree in OSDU by now to be able to understand how everything fits together, unless you're a technologist. (…) Much of the terminology, the way of working, and the way of thinking that comes from the technical side carries over when this is to be realized and commercialized, so the same terminology continues to be used."

Another issue that arises is how the lack of conceptual clarity creates frustration and confusion between different professional communities, as key terms are interpreted differently. This challenge is highlighted by another informant, who explains how various professional groups interpret both OSDU itself and central concepts such as *system of record* and *system of engagement* differently. Because the technical terminology and the very purpose of OSDU are understood in different ways by different actors, it becomes difficult to establish a shared understanding of the data platform:

> "Everyone has a different understanding of what OSDU is, where it is, and what it's supposed to do. (…) There's all this hype and talk, and then it just turns into complete chaos."

Not only are the concepts difficult to grasp, but they also fail to generate enthusiasm among the groups expected to adopt the platform. What appear to be sophisticated and precise explanations to the development teams come across as unnecessary and overly complicated "hype" to the end users, in this case, the subsurface professionals. When they neither understand nor share the enthusiasm for the technology, their interest in engaging with the digital transformation and implementation process diminishes. One informant expressed this sentiment clearly:

> "All those fancy words, the subsurface community couldn't care less."

The consequences of this technical language are fragmentation in the implementation of OSDU: the lack of translation between technical and business perspectives creates uncertainty and misunderstanding across different parts of the organization, leading to a gap between professional communities that end up talking past each other. Business representatives and end users are key stakeholders who often do not fully understand what OSDU is about, which in turn weakens their ability and willingness to engage in its implementation and further development. This disconnect can result in a gap between the platform's technological potential and how it is actually used in everyday organizational practice. Instead of a unified transformation toward a shared platform logic, OSDU becomes something understood only by a few, while others remain passive or skeptical. This undermines the platform's anchoring not only within individual organizations but also across the industry. One informant explained it as follows:

> "When you talk to a customer about the platform, the discussion quickly becomes very technical. (…) You end up with confusion within the companies rolling this out, where the business side, the regular users working in applications and so on don't really understand what this is actually about."

When OSDU is primarily understood and discussed in technical terms, it becomes difficult to recognize the platform's strategic potential. The lack of translation between technology and business contributes to misunderstandings, fragmented implementation efforts, and low engagement outside of the technical communities. In the next section, I demonstrate how this manifests through a pervasive lack of strategic anchoring of OSDU within organizations.

5.3 Lack Of Strategic Anchoring

Although top management within the operator companies recognizes that the OSDU data platform is important, it nevertheless lacks clear strategic anchoring at the organizational level. Several informants in middle management roles express that it remains unclear what the platform actually is, why it should be adopted, how it should be integrated into existing workflows, and which problems it is intended to solve. This uncertainty is often described with frustration in their dialogue with senior management, where it appears that top leaders provide little strategic direction for the platform. As a result, strategic uncertainty arises further down in the organization, and responsibility for implementation tends to remain within technical departments, without active ownership from top management. When leadership lacks sufficient understanding of the platform's functionality and potential, it becomes difficult to formulate an overarching vision that integrates OSDU into the company's strategic direction. Several informants explain that a central reason for this uncertainty among executives is the absence of a clearly defined problem that can justify the initiative. Many technological solutions have been developed using OSDU, but since they were not designed to address specific challenges, they lack grounding in real needs. When technology is developed without a clear understanding of what it is meant to solve, for whom, and why, it becomes difficult to assess its actual value, both for end users and for management. Consequently, the platform is not perceived as a practical tool for solving specific needs or as a means to support strategic goals. The lack of a clear definition of what OSDU is intended to solve was expressed by one informant as follows:

> You must first have a problem you want to solve. (…) Right now, we are creating a lot of technology with OSDU, but what problems are we actually trying to solve?"

This lack of grounding in specific problems means that investments in OSDU often take place without a realistic understanding of what implementation actually requires, organizationally or financially. The absence of strategic understanding of OSDU at the top management level has led to a flawed perception of what platform implementation entails. When it is treated as an isolated technology implementation project, funding is allocated without accounting for the broader organizational and change management requirements. As a result, the likelihood of successful implementation is significantly reduced, while frustration grows among those responsible for carrying it out.

This creates a mismatch between what top management expects the technical teams to deliver, and the prerequisites needed to succeed. The result is a clear disconnect between strategic decision-making and the actual costs of implementation. As one informant expressed:

> "What I've been struggling with, both at Operator 1 and 2, is getting support from management. They say, 'Do OSDU, no problem, here's 30 million, make it happen.' But no, you can't make it happen with 30 million. It takes so much more than that."

Beyond this lack of insight, differing understandings and expectations make it difficult to communicate what the platform truly needs. Those working on OSDU's development and implementation feel that simply presenting the facts is not enough, they must sell the platform to management to secure necessary resources. Fear of creating unrealistic expectations by overselling potential features and benefits creates a situation where no one manages to communicate what is actually required, either upwards or downwards in the organization. When communication is tailored to gain support rather than to present a realistic picture of needs, the foundation for shared understanding, prioritization, and strategic anchoring is weakened. One informant explained:

> "You need full support, but they want to see value. (…) You have to sell it to get support to continue, and when you sell it, you use nice words, and then they think it's more ready than it is. But then you have to tell them the reality and what they can expect, and then you're afraid you won't get the support you need. There's a lot of politics here, in all oil companies."

There is also an expectation that those working closely with OSDU know what is required for implementation. However, this turns out not to be the case:

> "No, and none of us are really clear enough with them about what it takes because we don't actually know ourselves."

If no one fully understands what is required, neither top management nor those developing the platform, it becomes nearly impossible to establish clear goals, roles, and expectations. This uncertainty around OSDU is not merely a matter of weak communication; it reflects a deeper structural issue: implementation without a defined framework or strategic leadership. When even the most involved actors are unsure of what success entails, ownership, coordination, and progress become difficult to achieve. This lack of clarity also opens the door for a wide range of actors to get involved without having the necessary competence or understanding. As one informant describes:

> "The problem, I think, is that there are a lot of people involved in this who don't really have the prerequisites to understand what it's all about."

Taken together, these accounts illustrate how weak strategic anchoring and insufficient governance affect direction and ownership, creating uncertainty about who does what, and why. Consequently, OSDU moves forward without a shared understanding, structure, or prioritization. The lack of strategic anchoring and managerial insight ultimately results in poor value realization from the platform's implementation.

5.4 Shift In Power Dynamics And Business Model Conflict

As a digital platform, OSDU contributes to a reconfiguration of the established power balance between different actors in the oil and gas industry, particularly between operators and IT vendors. Several informants describe how operators, through access to standardized interfaces and open data models, gain greater control over their own data and more freedom to choose and combine applications. This reduces the dependence on proprietary systems and weakens traditional forms of vendor lock-in. At the same time, it creates uncertainty about how IT vendors will adapt to OSDU and maintain profitability in a more open ecosystem.

The following subsections will examine this power shift from two perspectives: first, how operators experience increased flexibility and control within the new platform ecosystem (5.4.1), and second, how the platform ecosystem introduces new challenges and uncertainties for IT vendors (5.4.2). Together, these themes illustrate how OSDU transforms the underlying conditions for interaction and role distribution within the ecosystem.

5.4.1 Increased Flexibility And Control Amongst Operators

Several informants describe how OSDU strengthens the position of operators by reducing their dependency on proprietary systems. Through industry-wide standardization and a shared data platform, operators gain greater control over their own data and increased flexibility in their choice of applications. This enables a more modular system architecture, where companies are no longer locked into a single IT vendor, as the premises and model defined by OSDU establish a common standard. IT vendors who previously delivered customized, proprietary solutions, and who held control and ownership of the data can no longer lock operators in through technological dependencies. Instead, operators now set the terms for how data should be delivered and structured. As one informant explained:

> “We’re kind of going back and saying that the operator (…) is the owner of the data, and since the premises and the model are defined there, you’re detached from the proprietary solutions and databases, and formats that come with that, you have to relate to one and the same format, the one defined by the OSDU platform.”

Although the OSDU platform technically defines the standards for data modeling and interfaces, it is the operating companies that own the process of implementing and utilizing them. IT vendors have traditionally held significant power by designing and controlling proprietary data formats that effectively locked clients into their systems and solutions. With OSDU, this dynamic shifts. Vendors must now adapt to an architecture in which operators own the data and define both the data structures, choice of standards, and which solutions are allowed to connect. This gives operators increased definitional power, not because they create the standards themselves, but because they determine how they are applied and what requirements vendors must meet. Consequently, operators gain greater influence over the structural conditions of the industry. One informant offered a concrete example through contracting strategies:

> "You can even go as far as to include in your contracting strategy that if you're buying new subsurface tools, they must be OSDU-compatible. Then you start setting a precedent a strategic direction for the entire industry, not just for your company."

At the same time, operators gain more freedom to choose and to exclude vendors that fail to meet these requirements:

> "It's a form of platform governance that gives a lot of power to the operator, because it means we can pick and choose exactly which type of software we want, and that shakes up the commercial model for these actors. Especially for the big ones, it's quite scary."

By requiring OSDU compatibility in procurement and contracts, operators not only establish technical standards but also influence the market logic, pushing IT vendors to adapt through strategic purchasing and selective use of solutions. However, one informant emphasized that this change in dynamics does not necessarily mean the role of IT vendors is diminished. Rather, it means that the flow of data should increasingly be controlled by the operator, regardless of which tools are used:

> "Yeah, and it's not really the goal to make ourselves independent of these applications, but instead of having processes where you import raw data into an application, do one or several layers of processing, and then store the results, the processed or interpreted results within the same application."

This nuance clarifies that the shift in power is not about operators seeking to take power from IT vendors but about changing how data is processed and flows through the ecosystem. The resulting consequences for vendors are therefore not intentional, but an inherent outcome of the new platform logic. Nevertheless, this shift in control and architecture fundamentally alters the premises for IT vendors' roles within the ecosystem.

5.4.2 Increased Uncertainty And Challenges Among IT Vendors

While operators gain greater control through OSDU, several informants point out that this simultaneously creates increased uncertainty for IT vendors. The platform challenges their business models, which have traditionally relied on tightly integrated solutions and customer-specific adaptations. When data must be shared in open formats and applications are built on a shared platform, uncertainty arises around what role IT vendors will play and how they can generate value within this new ecosystem.

Although some operator informants emphasize that the goal is not to weaken vendors' positions, others describe the development in more confrontational terms. This reflects conflicting dynamics: the ideal of collaboration versus the reality of a redistribution of control that many vendors experience as a loss of power. It can be interpreted that, for some operator environments, OSDU functions as a strategic move to tip the balance of power in their own favour. One informant notably described the situation as "pulling the rug out from under them," an expression that implies a sudden and destabilizing action in which the other party loses footing. This suggests not only a significant shift in power but also a willingness to enact it without necessarily ensuring a smooth transition for IT vendors. While not necessarily hostile, the approach does not appear particularly collaborative either. A geophysicist with experience in digitalization leadership and from both large and small operator companies described it as follows:

> "The vendors (…) their business models are turned upside down. We're pulling the rug out from under them by doing this. And we're forcing them to come along. It's not yet been fully defined how they're supposed to make money once OSDU is up and running."

IT vendors receive little in return for this disruptive change, as it remains unclear how the platform will allow them to sustain profitability. For many, OSDU undermines the very foundation of how they previously generated revenue. This represents a clear incentive problem described by several informants: vendors are being asked to contribute to a platform that potentially erodes their own market position. In the open platform ecosystem, they are forced to expose their products to competition since they can no longer offer complete, proprietary solutions. What they now contribute: technical functionality integrated into a broader system is not something they can easily monetize. It is not a standalone product they can sell but a component that customers already expect as part of the platform. Consequently, OSDU does not necessarily appear economically attractive from the vendors' perspective, weakening their motivation to support an initiative that depends on broad industry participation. As some informants explained:

> "I see that the software vendor industry has a challenge with the business model around OSDU. How are they supposed to make money by contributing to OSDU? If all they do is open up their systems for more competition (…) how do you get them onboard when they're opening up to more competition rather than gaining an advantage?"

> "They get no financial gain from it at all, because it's not a new product to sell—it's just functionality within an existing product, so it doesn't add any value for them."

Several informants also highlight that vendors' capacity to adapt varies greatly. Large companies are seen as highly engaged and strategically forward-looking:

> "They're very proactive: 'We're going to take a leading position. This is how we survive and grow.'"

Smaller vendors, however, are more vulnerable, as they often have fewer resources and limited capacity to adapt to new technical and business requirements. In a transformation that demands both technological modernization and new business models, this could mean that only the largest players manage to keep up. This challenges the notion of OSDU as an open and inclusive platform and risks excluding smaller actors from the ecosystem. As one informant noted:

> "I can understand that maybe smaller vendors with fewer resources haven't come as far as the big ones."

In addition to these differences in adaptability, informants also pointed to challenges in reaching agreement on common technical standards. Vendors who previously operated independently with their own data models tailored to their systems now have to compromise in developing a unified standard. Aligning these needs across different vendors can create friction and reduce motivation to participate in the standardization process:

> "Where one vendor needs certain attributes and another needs others, what should actually become the standard when their requirements differ? That's been the biggest challenge."

Without active participation from IT vendors, OSDU cannot progress. Operators acknowledge that vendors are vital contributors to the platform ecosystem and recognize that they, too, must benefit for the initiative to succeed. Lack of vendor participation is described by one informant as a "counterforce", implying not just absence but active resistance. The informant emphasized that operators have a responsibility to help vendors develop sustainable business models to ensure that the benefits of participating outweigh the costs in time and resources:

> "We can't get around the fact that vendors also need to make money from the system—otherwise, there will be a counterforce in the entire OSDU development that we don't want. (…) We have to make sure everyone in the system finds a business model that works, otherwise they'll never spend their time or money on it."

Several informants also reflected on how operators might help address IT vendors' OSDU-related challenges. Rather than waiting for vendors to integrate their applications with the OSDU data platform on their own, informants suggested more collaboration, co-financing, and joint initiatives to ensure progress in platform development. By providing financial support, operators hope to lower the barrier to entry, especially for smaller vendors who need assistance. There is thus a clear intent to collaborate, although these proposals mainly address technical compatibility rather than long-term profitability. As such, the economic incentive problem remains unresolved, and the suggested measures may appear limited in scope. Even with goodwill and collaboration, these actions do not address the vendors' need for a sustainable business model, suggesting that operators' efforts to "help" may ultimately serve their own interest in accelerating adoption:

> "Maybe we could start with a type of proof of concept together with vendors. Maybe we could even support the smaller ones, perhaps sponsor them a bit in relation to OSDU, at least for the most central applications."

> "If I teamed up with all the oil companies involved in OSDU, and we all use a specific vendor for reservoir modeling (…) the four of us could co-finance building the link between OSDU and that vendor's system."

Taken together, the two subsections illustrate how OSDU is reshaping the power balance in the ecosystem: operators experience greater flexibility and control, while IT vendors face increasing uncertainty regarding their role and revenue opportunities. The distribution of costs and benefits within the platform ecosystem thus appears uneven.

5.5 Strategic Deadlock

The technical understanding of OSDU as a technology implementation project (5.1), the use of technical language in describing the platform (5.2), the lack of strategic anchoring within the top management of operator companies (5.3), and the asymmetric distribution of benefits and risks among actors (5.4) together result in a situation where the involved parties are mutually dependent, yet no single actor has sufficient incentive or mandate to take the lead. Operators rely on IT vendors to develop OSDU-compatible solutions, while vendors await clearer requirements and financial commitment from the operators. The situation can be compared to a *Mexican standoff*: a term from popular culture referring to a deadlocked scenario in which no party can or will take the first move (Merriam Webster Dictionary, n.d).

Figure 5: Own illustration of a Mexican Standoff

Building on this picture, I introduce the analytical concept of strategic deadlock to describe a state in which mutual dependence, lack of coordination, and absence of shared direction halt progress in the development of OSDU as a platform ecosystem. This strategic standstill is described by several informants, each offering slightly different interpretations. One informant explains it as a self-reinforcing cycle: a self-fulfilling prophecy where the expectation that it is "too early to invest" becomes the very reason progress stalls:

> "If everyone sits on the fence waiting for someone else to do the job, then it simply won't get done. And that means you end up with this self-fulfilling prophecy thing, where if everyone says they'll wait until that part has matured enough or until someone has gone into full production with it, if enough people take that approach, you'll wait forever, because no one ever gets to production. No one extracts value from it because everyone is waiting."

Another informant characterizes this strategic deadlock as a classic Catch-22 situation: use is necessary for the solution to mature, but it is not adopted because it is not yet considered mature enough:

> "You can't really implement something before it's mature enough. But that's the problem: you won't know if it's mature enough until you've tested it. So that's kind of how it is."

The deadlock is further reinforced by the fact that no actor is willing to bear the financial risk alone. Both operators and IT vendors recognize OSDU's potential value but refrain from taking the first step because the perceived risk is too high. Each hope that someone else will take the initiative:

> "But as it is now, all the customers are just waiting for someone to take the cost—to raise their hand and say, okay, we'll do it."

The informants' descriptions provide strong empirical support for the concept of strategic deadlock. The next two subsections elaborate on how this deadlock manifests in the data: first through the distribution of blame and unclear responsibility (6.4.1), where actors point to each other as responsible for driving the development forward; and second through the need for coordination and shared direction (6.4.2), which highlights how a structural vacuum emerges when no actor assumes a clear leadership role.

5.5.1 Distribution Of Blame And Unclear Responsibility

A central theme emerging from the data is how actors shift the responsibility for realizing OSDU onto one another. Informants from the operator side point to IT vendors as the party to blame for not taking sufficient responsibility. There is an expectation that IT vendors should be able to establish and adopt the OSDU standard independently, without requiring additional guidance or follow-up. The following quote illustrates this view:

> "It's more up to the software companies to, you know, figure out the standard and start using it."

In addition, operators also expect to receive complete and functional solutions. This expectation contrasts with the current situation: despite IT vendors formally holding responsibility for delivery, operators describe how they often have to make adjustments and complete the work themselves for the solutions to be usable. One informant uses the metaphor of "buying half a car" to express frustration over receiving incomplete products that require further work before they can be put to use:

> "Today we spend way too much internal time helping the vendor. We're buying a service, right? But then we have to fix it before we can use it, it's like buying half a car, not a whole one."

However, IT vendors in turn place the responsibility back on the operators, arguing that it is the operators who must set the necessary requirements and expectations for progress to happen. Vendors claim they need a clear push from the operators and expect them to take a leading role in both the development and implementation of OSDU. Expecting vendors alone to define the direction is seen as both unrealistic and unfair. This push refers not only to technical specifications but also to strategic initiative and clear signals from the operators.

This responsibility vacuum, where both operators and vendors point at each other while waiting for action. This halts the progress that OSDU's development depends on. As several informants explain:

> "Nothing will happen if everyone just expects the software vendors to figure this out on their own. There has to be pressure on them, requirements and expectations from the operator companies."

> "There has to be a strong push from those operators who actually want to adopt this, especially from the six founding member companies."

There is thus a clear disagreement about who should deliver and what is expected to be delivered. This misalignment creates friction in collaboration and contributes to the stagnation of OSDU's development.

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5.5.2 Need For Coordinating Force And Shared Direction

A key component of the strategic deadlock is the absence of a coordinating force capable of creating direction and alignment across actors in the ecosystem. When responsibility, incentives, and initiatives are dispersed and unclear, a clear need arises for either actors or mechanisms that can unite stakeholders around common goals, clarify roles, and drive collective progress. Without such coordination, the data platform cannot function as a shared industry solution, and development stagnates.

Several informants emphasize the need for a coordinating force, either through industry-led mechanisms or, as some suggest, through regulatory intervention. When industry actors are unable to agree on a common way forward, government mandates may serve as a necessary push. By requiring the use of industry standards, regulatory pressure could compel both operators and IT vendors to act, aligning the ecosystem around a shared framework. Regulation thus appears as a potential means to break the strategic deadlock that currently hinders OSDU implementation:

> "If Norwegian authorities were to say, okay, from now on we want data to be in the industry-standardized format from OSDU, then that would push many of these software vendors to become compatible with it."

In addition, several informants highlight the importance of active collaboration among actors to make OSDU work in practice. In the absence of clear centralized governance, direct cooperation between operators and IT vendors becomes a key condition for progress. Such bottom-up initiatives are not necessarily ineffective; they can foster trust and momentum within individual projects. However, their impact remains limited without a more systematic and coordinated effort across the ecosystem. The following quote illustrates a pragmatic approach, where actors compensate for the lack of top-down coordination through direct dialogue and joint problem-solving:

> "That's why the company had open collaboration with various application vendors. We put them physically in the same room and say: great, you're all part of the OSDU forum, let's make this work. And then they collaborate."

Taken together, the findings in Chapter 5 point to an underlying strategic deadlock shaping the adoption of OSDU. The various themes: operators' technical understanding of OSDU, the lack of strategic anchoring among top management, power shifts between operators and IT vendors, the absence of incentive structures and governance, and the lack of industry-wide coordination, do not appear as isolated challenges but as mutually reinforcing elements that collectively lock development in place. The transformation represented by OSDU requires industry-wide adjustments, and it is evident that the challenges are not primarily technological, but rather structural and strategic. This provides the foundation for the subsequent discussion in Chapter 6, where these findings are analyzed through the lens of platform, ecosystem, and governance theory.

6 Discussion

In light of the research question: *"How does the OSDU platform challenge established forms of collaboration and actor roles in the oil and gas industry, and what barriers hinder the development of the ecosystem?"*, the findings from Chapter 5: Results show that the implementation of the data platform changes the very foundation of how operators and IT vendors collaborate and distribute responsibility. This creates uncertainty regarding roles and governance responsibilities and contributes to increased friction between actors. A lack of strategic anchoring, fragmented incentives, and mutual waiting weaken the potential for coordinated development. The challenge of integrating third-party solutions into OSDU and thereby realizing the platform's value is not technical. It lies at the industry level and stems from the absence of clear leadership to drive the changes necessary for established third-party vendors to join the OSDU platform ecosystem. Everyone is waiting for someone else to take the lead, which results in paralysis. This mutual waiting creates what is referred to in this study as a **strategic deadlock.**

In the following discussion, this deadlock is analyzed through the lens of platform theory and concepts such as data governance and platform governance. The purpose of this discussion is to shed light on how the absence of holistic governance contributes to the ecosystem's unrealized value, and what measures may be necessary to move forward. The discussion is primarily based on the perspectives and practices of the operators, as their experiences and position within the ecosystem particularly illuminate the challenges related to governance and coordination.

The chapter is structured into six thematic subchapters. First, I highlight the operators' sequential and separate understanding of technology and organizational change (6.1). Next, I show the lack of focus on platform logic in the operators' approach to OSDU (6.2). I then discuss how the absence of platform leadership is linked to the operators' dual role in the system, both as key users and as expected drivers of the platform's development (6.3). How the operators' lack of responsibility as platform leaders creates incentive failures and collaboration problems with IT vendors is discussed in (6.4). After that, the need for holistic governance is discussed, with particular emphasis on role distribution, governance responsibility, and regulation as potential coordinating mechanisms (6.5 and 6.5.1). I then present some recommendations for what organizations joining platform ecosystems should be aware of (6.6). Finally, I discuss the limitations of my study (6.7) and how OSDU can be viewed in a sustainability context (6.8).

6.1 A Sequential Understanding Of Change: Technology First, Platform Governance Second?

The results from the interviews show that although the informants recognize that OSDU can contribute to organizational change, technological development is seen as the primary driving force. Organizational development is understood as something that follows afterward as a natural and reactive consequence of having new technology in place. This understanding implies a sequential view of change, where technology and organization are developed independently of each other, and where the technical aspects must "work first" before it makes sense to implement organizational adjustments.

This type of sequential thinking aligns with what Markus and Robey (1988) refer to as the technological imperative: a deterministic understanding in which organizational change is assumed to result from the inherent properties of technology. In this view, the organization appears as a passive recipient of technological change rather than an active co-creator. Figure 5 provides a visual representation of this line of thought.

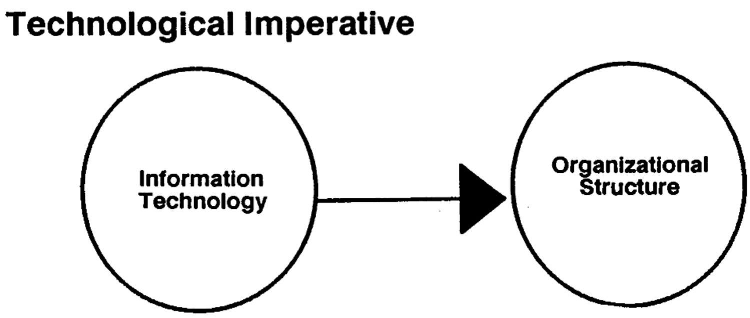

Figure 6: The technological imperative (Markus og Robey, 1988)

The reason this finding is particularly interesting is that it reveals how the strategic platform leadership role becomes underprioritized. This does not necessarily occur due to resistance or ignorance, but rather through a specific understanding of change as something both linear and technology driven. When it is assumed that technology must come first, and that organizational adjustments will naturally follow afterward, it becomes difficult to think holistically about ownership, governance, and coordination, all of which are required for deliberate platform leadership.

This can be related to Markus and Robey's (1988) explanation of the emergent perspective, where change arises through the interaction between people, technology, and organizational context. This perspective aligns with the platform literature's understanding of technological and organizational co-evolution, where value creation in such systems presupposes that technological development and organizational adaptation occur in mutual interaction, not as separate and linear processes (Tiwana, 2014; Hein et al., 2019; Parker et al., 2016).

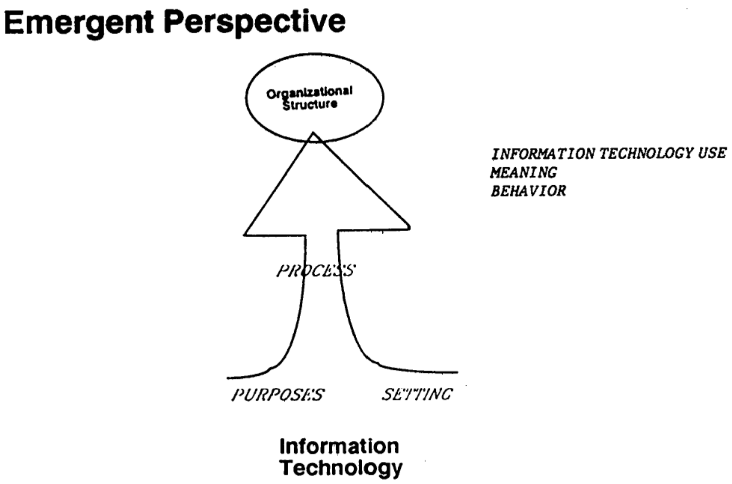

Figure 7: The emergent perspective (Markus og Robey, 1988)

It can be argued that the technological imperative does not fit within a platform context, and that the emergent perspective better captures the complexity of platform ecosystems. In the context of platforms, technological development and organizational adaptation must occur in parallel, as value creation depends on the active interaction between actors, technology, and structure (Markus M. L., 2004). As Baldwin (2024) points out, organizations may experience stagnation when they attempt to force new technology into old structures, rather than co-developing technology and organization simultaneously. For the operators, this means that the role as user and the role as platform leader cannot develop sequentially, but must be managed concurrently, and that adapting to existing frameworks rather than engaging in strategic rethinking may weaken platform leadership.

Adopting a change perspective shaped by the technological imperative may help explain why the operators take limited ownership of the governance of the platform ecosystem's development. A mindset where organizational adaptation is viewed as something that will happen "on its own" after the technical implementation of OSDU can serve as a rationalization of the passivity that results in reduced incentives to assume leadership responsibility. If waiting becomes rational, the strategic deadlock that has emerged will not be resolved in the near future. Failing to see change as something that arises through the interaction between technology, and the platform ecosystem may, in practice, become a death sentence for OSDU's viability as a platform.

6.2 OSDU As A Multilayered Platform

OSDU is described as a data platform, and the way operators relate to it in practice reflects this. As described in the literature, data platforms are characterized by data itself being the primary value-creating resource, with value generated through the management, sharing, and reuse of data in the form of data products (Petzold, 2019; Zasadzinski et al., 2021). Through a shared digital solution, it becomes possible to use data without physical transfer while ensuring security and access control (Zasadzinski et al., 2021).

The interviews showed that most operators have a technical approach to OSDU and view the implementation process mainly as a rollout of this technology. This in itself is not incorrect, but it appears that there is a limited understanding that OSDU is also an industry platform, as it is standardized and operates across markets and actors in the oil and gas industry. The platform enables data and industrial assets to be leveraged in the development of complementary applications and services, with the goal of shared value creation and profitability (Cusumano, 2022; Pauli et al., 2021; Baldwin, 2024). As a data platform, OSDU is part of a data ecosystem consisting of autonomous actors, including operators, IT vendors, and cloud providers. This means that OSDU functions as a marketplace where data producers and consumers operate together: IT vendors are responsible for cleaning, structuring, and quality-assuring the data, while operators use the data for various business purposes (Kari et al., 2025). Value is created through complementary investments and mutual interdependence between actors, and governance occurs through negotiation rather than hierarchy. This governance logic differs from the industry's traditional models and illustrates why OSDU is not merely a technical platform, but also an attempt to establish a new form of industry collaboration

(Baldwin, 2024). This means that while the data platform itself is a technical solution, the data ecosystem in which it operates gives it a business dimension that cannot be ignored.

In line with platform logic (Parker et al., 2016; Tiwana, 2014; Hein et al., 2019), a platform such as OSDU requires more than a technical solution. When the platform is viewed merely as a technological tool for internal use, its sociotechnical nature, that is, its function as part of a platform ecosystem is overlooked. If the platform fails to be anchored in a shared strategic understanding across all actors in the ecosystem, it risks remaining an expensive and isolated solution that does not address the industry's core challenges related to interoperability, data sharing, and efficient collaboration.

The findings show that operators largely underestimate the importance of this business dimension. By viewing OSDU primarily as an internal technological initiative, they fail to recognize the need for coordinated strategic action within the platform ecosystem. As central actors, this approach contributes to the absence of collective initiatives, leaving the platform's potential as an industry standard unrealized. This represents the core of the strategic deadlock: when operators treat OSDU as an isolated technological solution rather than a shared platform strategy, coordination, investment, and value creation at the ecosystem level fail to materialize. The result is that the platform remains in an intermediate state: technically established, but strategically paralyzed, unable to move toward full implementation.

The next chapter explores how the lack of a holistic understanding of OSDU's platform logic further shapes how operators perceive and enact their roles within the platform ecosystem.

6.3 User Or Leader? The Operator's Understanding In The Development Of OSDU

The operating companies hold a dual role within the OSDU platform ecosystem: they are both users of the platform and platform leaders through their ownership and engagement in the OSDU consortium. These roles involve different forms of responsibility and obligation. As users, operators have an internal responsibility to implement and adopt OSDU in a way that supports the organization's operational needs. This includes data migration, integration with existing IT solutions, and establishing internal guidelines for data use and data governance. As platform leaders, however, they have an external responsibility to develop, coordinate, and manage the platform ecosystem itself (Hein et al., 2019). This entails contributing to common standards, role distribution, incentive structures, and interaction between actors, with the goal of creating value not only for their own organization but for the entire industry. That operators hold this dual role means that their work with OSDU is not merely about internal technology adoption but also about strategic ecosystem leadership. Strategic ecosystem leadership involves exercising governance as a platform owner and assuming the responsibilities that come with that role. This aligns with the platform literature, which emphasizes that understanding platform architecture alone is insufficient; one must also recognize that the platform functions as a business model connecting people, resources, and organizations within a coordinated ecosystem (Parker et al., 2016).

The findings from Chapter 5: Results reveal that the operating companies are heavily focused on their role as users of the OSDU data platform. This is evident in their prioritization of internal data migration from existing applications to OSDU, their work on technical implementation including interoperability, standardized data schemas, and data governance, and their collaboration with external actors, particularly IT vendors, which is primarily grounded in their user perspective. This is not inherently negative; ensuring that the internal use of OSDU functions effectively as a collaborative system is important. However, it is understood primarily as a means to solve technical challenges. The OSDU data platform's digital solutions are both complex and flexible, built from modular components with open interfaces and shared infrastructure (Tiwana, 2014; Hein et al., 2019; Bonina et al., 2021). This flexibility offers operators freedom and adaptability, yet it also demands more strategic engagement than what is typically associated with a user role.

The interviewees' observations, however, indicate that more overarching, external issues such as coordination, role clarification, and the joint structuring of the platform ecosystem remain unresolved. This suggests that top management within the operating companies may be only partially aware of their company's actual role as a platform leader through participation in the OSDU consortium. Top management's resource allocation to OSDU-related work illustrates this lack of awareness. One informant described how, in dialogue with leadership about the implementation of OSDU, it was suggested that 30 million NOK should be sufficient to complete the project. This implies that top management perceives OSDU merely as an internal IT project focused on user support and system operations, not as something requiring deep strategic involvement.

It remains uncertain whether the operators' representatives in the OSDU consortium have the resources, capacity, or mandate to fulfill the platform leadership role in a way that connects technical work with the platform's broader strategic development. Those closely involved with OSDU are aware that they participate in important decisions about the platform's evolution. Nevertheless, their contributions are heavily technically oriented, whereas platforms require a combination of technical and market perspectives. Thus, OSDU must be understood from a sociotechnical perspective to grasp how digital platforms evolve and function within a broader context: as dynamic ecosystems where technology, organizations, and social mechanisms interact (de Reuver et al., 2018, as cited in Hein et al., 2019). The lack of alignment between operators' internal and external role understanding can be interpreted as a manifestation of the strategic deadlock, as the absence of clear ownership and holistic coordination causes progress to stall.

Because the platform strategy and development work appear to be dominated by an internal end-user perspective, it becomes difficult for technically involved personnel to communicate the need for clearer strategic direction upward in the organization. Operators act as users of OSDU in two ways: as internal end-users and as primary users within the ecosystem itself. Several informants expressed that there is a lack of overarching goals and direction for the internal OSDU work. Top management's earlier example of financial allocation indicates that they partially recognize the internal end-user perspective as relevant in discussions about OSDU. However, the lack of strategic resources and anchoring suggests they do not understand their role as users within the broader ecosystem. For middle managers, who are more involved in OSDU's end-user aspects, it remains unclear how OSDU should be shaped and embedded within the operators' overall business strategy.

Partial or missing ownership of both roles creates two problems. If top management is aware that operators are both the main user group within the platform ecosystem and its platform leaders, differing perspectives and communication issues may cause fragmentation between the two roles unless top management actively engages. If this awareness is lacking, top management may remain unaware that they are key user actors in the ecosystem, or that their platform leadership role even exists, leaving strategic development responsibilities unaddressed.

The consequence of this is that a clear linkage must be established between internal use and external coordination in the ecosystem for operators to fulfill their dual role as both user actors and platform leaders in OSDU. This linkage requires that operators understand their dual role as both internal user and external leader, and that both roles are given equal priority. Moreover, these roles must not exist as separate, since the operators' internal use and further development of OSDU increasingly affect other actors in the ecosystem.

A dominant technical perspective on OSDU overlooks the significance of the platform ecosystem. Platform theory emphasizes that a successful platform is not merely a technological solution, but an ecosystem in which actors engage in mutually dependent relationships, and value is created through interaction (Tiwana, 2014; Parker et al., 2016; Baldwin, 2024). When collaboration remains framed within a narrow, technical understanding of the platform, where the need for role clarification and cross-organizational coordination is largely invisible, there is a clear need for greater awareness of collaboration as a strategic dimension at the ecosystem level. The variety of theoretical approaches to platforms reflects this complexity: a platform is simultaneously a technological architecture, a market mechanism, and a social system. This complexity implies that platform leadership requires more than technical competence, it also demands strategic coordination and interdisciplinary collaboration at the ecosystem level. Without these, it becomes unclear who is responsible for what, and how efforts should be directed toward shared goals. The absence, or only partial ownership of the platform leadership role among operators may result in OSDU's failure to develop into a functioning ecosystem, leaving it trapped in the strategic deadlock.

6.4 When No One Leads: The Consequences Of Leaderless Platforms

As platform leaders, operators have a responsibility to accommodate for the IT vendors participation and value capture in the ecosystem. This imbalanced value creation between operators and IT-vendors can have serious implications for the ecosystem's functionality and differs to how platforms are ideally meant to operate. According to Hein et al. (2019) and Tiwana (2014), the goal of platform design is to ensure that all actor groups have both the incentives and opportunities to create and capture value, thereby fostering active engagement within the ecosystem. When such incentives are missing, both participation and complementarity are undermined, weakening the overall value of the ecosystem. The governance logic of a platform must balance central coordination and decentralized participation, while ensuring that incentives are sufficient to motivate all actors to contribute (Baldwin, 2024). This does not mean that operators must solve the incentive problem alone: it requires collaboration with IT vendors. Suggestions such as helping vendors integrate existing solutions into OSDU are insufficient, as they fail to address the underlying challenges and needs of IT vendors. Such approaches demonstrate how operators avoid assuming the leadership responsibilities that their ecosystem role entails. When operators expect vendors to participate, invest, and adapt without taking responsibility for the rules of engagement it becomes nearly impossible to build the collaboration they seek.

The transition from traditional models based on vertical integration and contract-driven relationships requires a different form of interaction, one in which multiple autonomous actors contribute to shared value through open and coordinated structures. This makes the development and governance of ecosystems such as OSDU particularly challenging (Bryson et al., 2015, as cited in Kari et al., 2025; Baldwin, 2024). The findings suggest that the role changes required by platform logic are difficult for operators to internalize. Without a clear early understanding of what the platform leader role entails, it is perhaps unsurprising that operators hesitate to take responsibility, especially if they assume governance still primarily concerns their own organizational interests. Because OSDU is an ecosystem, the consequences of poor ownership and unclear role distribution do not affect IT vendors alone. Baldwin (2024) explains that in the absence of hierarchical control, value creation must be ensured through complementary incentives. If one group of actors holds the power to withhold critical components and chooses to do so, the platform's overall value is weakened. Even with greater control and resources, operators still depend on IT vendors, their application solutions are critical components for operators' daily operations. This mutual dependency must not only be acknowledged but also actively managed.

The lack of network effects in OSDU can be understood as a symptom of incentive failure within the platform ecosystem. The findings show that this is linked to the concept of sidedness, which concerns how network effects are distributed across different user groups (Tiwana, 2014; Parker et al., 2016). On the user side, operators have incentives to join the platform ecosystem because they are offered clear value propositions: the ability to choose and customize solutions, and access to standardized, centralized, and structured data flows that enhance decision-making and operational efficiency.

On the complementor side, however, IT vendors lack such incentives. As discussed in Chapter 2.3.2 on network effects, a key value proposition for complementors such as IT vendors is that platforms provide access to an expanded user base and new market opportunities, reducing costs and increasing visibility (Tiwana, 2014; Parker et al., 2016). In OSDU, this is largely absent. Vendors already have operators as an established customer base, so they do not gain access to new markets through the platform. Expanding market reach is a central value proposition for most platforms, but in this context, it does not hold: the market is narrow and non-commercial, and the more complementors there are, the greater the competition. Another potential value proposition, increased visibility also fails to materialize, as OSDU lacks a marketplace function where vendors can promote their services. Consequently, reduced search costs do not serve as a meaningful benefit either.

Another value proposition for complementors is how platforms can reduce development costs by providing shared functionality (Tiwana, 2014). However, IT vendors have already developed their own proprietary solutions, meaning participation in OSDU requires significant investments to restructure these solutions to fit the platform's architecture. Thus, OSDU does not represent a cost-saving opportunity but rather a new cost driver. Moreover, many vendors' business strategies rely on specialized functionality and customization that differentiate their products from competitors. With OSDU's standardization, this differentiation is lost, forcing vendors to find new ways to create value and compete, most likely requiring high costs and business model restructuring.

When the cost–benefit calculation shows that returns do not outweigh investments, it is unsurprising that IT vendors are reluctant or sceptical. When those responsible for delivering the complementary solutions necessary for growth and mutual value creation choose not to participate, the platform cannot survive. Platform theory suggests that platforms require both critical mass and clear coordination to realize network effects (Tiwana, 2014; McGee & Sammut-Bonnici, 2015; Parker et al., 2016). Although there are many participants in the OSDU consortium, the absence of coordination renders the number irrelevant. The fact that IT vendors see little value in contributing reflects this shortfall, which platform theory refers to as a lack of strategic direction: a failure of governance mechanisms that ensure increased participation leads to net positive value (Tiwana, 2014; Parker et al., 2016). When a platform is not strategically governed, both same-side and cross-side network effects can turn negative. In OSDU's case, the negative cross-side effect manifests as the lack of participation. Examples of negative same-side effects include IT vendors developing competing or incompatible applications, leaving operators without access to cohesive and relevant services. On the operators' side, such effects arise when limited collaboration produces fragmented requirements, leading to lower utilization of shared solutions.

This creates a chicken-and-egg problem, where the platform's value depends on simultaneous contributions from multiple actor groups, yet none are willing to act first. Platform theory recognizes this as a fundamental challenge for two-sided and multi-actor platforms, one that must be actively addressed through incentive mechanisms and coordination (Caillaud & Jullien, 2003, as cited in Tiwana, 2014). Baldwin (2024) similarly describes this dynamic as the DMC error (Design–Meet–Commit), arguing that it is insufficient to wait for the market to trigger participation on its own. These dynamics illustrate the core of the strategic deadlock: actors are trapped in a situation where everyone is waiting for someone else to act, and the lack of coordination and incentives ensures that no one takes the first step.

That OSDU, in practice, functions more as a technical solution than as a strategically coordinated system illustrates how difficult it is to implement platform logic in established industries. Platform theory assumes that leadership and coordination are not accidental, but the result of deliberate governance. This means that a platform must have an ownership model that clearly defines how control and decision-making authority are distributed among actors. When such mechanisms are missing, the result is not only weak network effects, but also the preservation of old structures disguised as technical modernization.

6.5 From Data Governance To Platform Governance: Responsibility And Coordination In A Shared Ecosystem

The operators practice certain elements of data governance, particularly those related to technical control and data quality, but they fail to anchor these practices in a strategic whole. Data governance is rarely understood as an integral part of business development and is not linked to the broader governance needs of the ecosystem. As a result, platform governance, which should ensure shared direction, role clarification, and incentive structures is not exercised. The lack of a unified understanding of these governance forms has significant implications for how OSDU is both developed and functions as a shared platform.

As discussed in Chapter 2.5.1: Data Governance, data platforms have governance mechanisms for managing data embedded within their technical structure (Petzold, 2019; Zasadzinski et al., 2021). This means that data governance is not an addition but a core component of the platform as a digital solution, and therefore must be understood in strategic terms, as it directly impacts business value (Tallon et al., 2013). The findings suggest that operator representatives have a partial understanding of this. They have established structures and practices to maintain control over data quality, access, and standardization. The problem, however, is that these governance practices apply mainly to internal use and are not perceived as part of the strategic governance needs of a platform ecosystem. OSDU has indeed implemented certain technical mechanisms intended to support collaboration between actors. Mechanisms such as APIs function as so-called boundary resources, enabling integration and co-creation of complementary products and services. Several scholars have noted that such mechanisms can foster technological flexibility and support standardization and coordination (Ghazawneh & Henfridsson, 2013; Lusch & Nambisan, 2015, as cited in Hein et al., 2019). However, the findings indicate that such technical mechanisms offer only a superficial form of governance and may even create a false sense of coordination. In practice, they fail to address the need for shared direction, clear role distribution, and holistic platform governance. Without defined governance responsibility, and with high mutual dependency, the lack of coordination has serious consequences for the entire ecosystem, as shown in the strategic deadlock. In a fragmented and stagnant platform landscape, few truly benefit.

Moreover, managing data in isolation is insufficient, as data governance must be connected to how the platform as a whole is regulated and led. Platform governance concerns how interactions between actors are structured through decision rights, control mechanisms, and incentive structures. These governance mechanisms are used to achieve the platform ecosystem's overall goals and encompass a set of organizational and inter-organizational instruments (Wang et al., 2023, as cited in Kari et al., 2025). These mechanisms are interdependent: if one element is misaligned, it can cause fragmentation or collapse within the ecosystem (Tiwana, 2014). In OSDU's current state, it is uncertain whether such mechanisms exist, or whether they are properly aligned. The observed fragmentation suggests that the distribution of governance responsibilities does not function effectively.

This challenge becomes particularly apparent when examining the relationship between platform governance and data governance. The technical solutions that determine how data is collected, managed, and used must be linked to who holds decision-making authority over data use, how use is controlled, and what incentives ensure that data actually generates value within the ecosystem. This means that effective data governance cannot be achieved without embedding it in platform governance, and without linking it to the governance mechanisms that regulate interactions between actors. Figure 8 illustrates the principle of integrated or holistic governance.

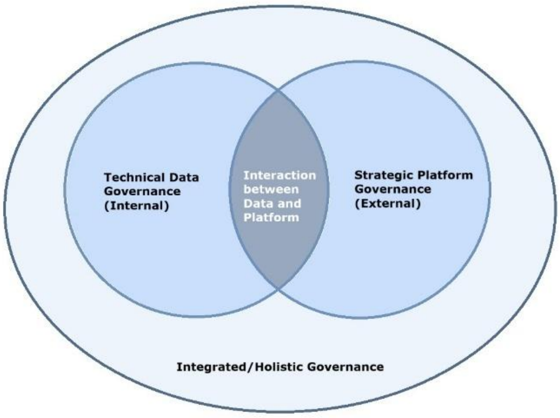

Figure 8: Own illustration of Integrated/Holistic Governance

The need for holistic governance is amplified in platforms organized as consortia, such as OSDU. Consortium-based platforms rely on shared and network-based ownership, where multiple actors jointly establish and maintain governance mechanisms (Hein et al., 2019; Kari et al., 2025). The more actors that share responsibility and hold equal authority, the harder it becomes to achieve a common direction and unified practice, even when all actors are cooperative. This reinforces the need for a centralized form of coordination, even within decentralized platform models. Without someone or something to steer, everyone rows blindly, often in different directions, while the ship remains motionless in the water.

6.5.1 Regulatory Intervention As A Coordination Mechanism

In situations where actors within the platform ecosystem are unable to agree on a common strategic direction, combined with unclear divisions of responsibility and the absence of any actor assuming a coordinating role, the survival of the platform may become dependent on regulatory intervention.

Several informants from the operator side highlighted regulatory requirements as a potential mechanism to break the strategic deadlock that has led to organizational paralysis. Regulation was proposed as an external authoritative force that could unite the industry around a shared standard and thereby compel action from the actors most in need of it, in this case, the operators and IT vendors. These proposals suggest that operators recognize that voluntary coordination may not be sufficient when incentives are unevenly distributed and governance responsibilities remain undefined. The proposals appear as a call for assistance from an actor not only possessing formal authority but also perceived as better equipped to establish common rules and create momentum in a stagnant landscape. At the same time, this raises the question of whether platform governance can, or should be outsourced to external entities, or whether it fundamentally requires collective accountability within the ecosystem itself.

Based on my understanding of platform theory, I argue that such regulatory interventions should not be dismissed; they may be necessary to initiate coordination when internal mechanisms fail. Regulatory bodies can contribute legitimacy, incentive mechanisms, or momentum to break the stalemate and drive more holistic governance of the platform. However, it is essential to emphasize that regulation cannot replace internal platform governance within the ecosystem. As discussed earlier, effective governance in platform ecosystems emerges through an interaction of organizational and institutional mechanisms. If external regulation becomes the sole driver of development, there is a risk that actors will abdicate responsibility for long-term coordination. Moreover, the involvement of regulatory authorities can be resource- and time-intensive, especially when dealing with an international, industry-driven initiative like OSDU that spans multiple jurisdictions. Different countries operate under varying requirements for data security, ownership, and technological standardization, which may further complicate coordination. When key actors already struggle to achieve consensus internally within the ecosystem, involving external regulatory bodies may amplify the complexity rather than reduce it. Regulation, therefore, should not be seen as an alternative governance logic, but rather as a coordination tool that can help trigger collective action. Regulation must also be applied with caution: as support, not burden, and in ways that do not increase resource strain or delay progress. The success and sustainability of OSDU ultimately depend on a clear combination of actor accountability and regulatory support.

6.6 Recommendations For Organizations Joining Platform Ecosystems

To avoid ending up in a strategic deadlock as described above, it is not sufficient for organizations participating in platform ecosystems to view themselves merely as users of a technical solution. Particularly in cases where an organization also participates in the consortium that leads the platform, it must take active ownership of its role as an ecosystem leader and assume the strategic and coordinating responsibilities that this role entails. The following points outline key prerequisites for understanding and fulfilling this role effectively.

First, actors that combine user and governance roles in consortium-based platforms must develop a deeper understanding of the platform ecosystem itself. In digital platforms, it is the digital products or services that form the core of value creation, but this value is only realized when the platform is seen in connection with the business ecosystem of which it is a part. This means that organizations must not only understand the mutual interdependence through which actors co-create value but also stop treating the development and implementation of such platforms as purely IT projects. Platform initiatives must instead be approached as sociotechnical initiatives, where technology and organization evolve in close interaction.

Second, organizations that both participate in and lead platform ecosystems must establish compelling value propositions for complementors, as illustrated by the OSDU case. Without clear incentives, complementors will not join the platform. Organizations must therefore specify how participation creates value for complementors: What benefits can be realized: cost savings, increased visibility, access to new markets? How can these benefits be achieved in practice? And most importantly: will the value proposition outweigh the costs associated with adapting existing solutions for platform participation? Only when the value propositions are convincing and achievable will complementors be willing to invest time and resources into the platform. Such engagement is essential for network effects to emerge and for the platform to evolve through active collaboration.

Finally, actors with governance responsibility in consortium-based platforms must jointly develop a clear and binding ownership and platform governance model. This model is necessary to establish shared accountability, distribute decision-making authority, clarify roles, and ensure a common strategic direction. Once developed and implemented, this will enable more effective management of platform development. If the actors encounter difficulties in reaching agreement on the ownership model, regulatory bodies or neutral third parties may assist in facilitating the process, but only as support, not as a governing force.

6.7 Limitations Of The Study

Although this study has addressed the research question, there are still certain limitations related to the research design, data collection, and data analysis. The following subsections discuss the study's main weaknesses. By highlighting these areas, I aim to provide insight that may help others who wish to explore the same phenomenon to build upon and further develop this research.

6.7.1 Limitations Related To Research Design

The chosen research design was well suited to my research question; however, it does have its weaknesses. Berg (2009, as cited in Muzari et al., 2022) points to several limitations: qualitative research approaches do not produce generalizable results due to their relatively limited scope. It is also emphasized that the researcher conducting a qualitative study may risk influencing or distorting the data during the process. Personal bias can undermine the study's credibility and transferability (see Mohajan, 2018; USC Libraries, 2018, as cited in Muzari et al., 2022).

This weakness is also discussed in connection with the use of the case study design in research: case studies do not always follow systematic procedures, and the findings may be influenced or shaped by the researcher's own perspectives. The researcher must remain aware of this and be critical when analyzing data and assessing participants' contributions. This is essential to avoid bias and other errors that can weaken the study's confirmability, reliability, transferability, and credibility (Yin, 2009; Briggs & Coleman, 2012; Mohajan, 2018, as cited in Muzari et al., 2022). In selecting the research design for my study, I was aware of the risk that my own biases could have influenced the results. Although I made every effort to minimize this, it is likely that underlying biases affected how I formulated follow-up questions, interpreted statements, and emphasized certain perspectives in the analysis. This is particularly relevant for a study based on semi-structured interviews, where the researcher serves as an active instrument in both data collection and interpretation. Additionally, I am not an experienced interviewer, which in itself represents a methodological limitation when using interviews as a data collection method.

Furthermore, the findings have limited generalizability, as they are context-dependent, narrow in scope, and tied to a specific time and situation in the implementation of the OSDU platform. This means that the results may not be directly transferable to other organizations, time periods, or technological initiatives. Nonetheless, I believe the study still provides valuable insights that are relevant beyond this specific case, particularly concerning how actors relate to platform logic and industry transformation.

Finally, the choice of a cross-sectional approach was made due to time constraints for completing the study. This approach provided a focused snapshot of how actors understood and engaged with the platform at a given point in time, offering valuable insight into a specific stage of development. However, this choice also means that the study does not capture changes over time, limiting the ability to comment on the evolution of platform dynamics and actors' role perceptions in the longer term.

6.7.2 Limitations Related To Data Collection

The selection of informants has influenced the breadth and diversity of the data foundation. The study is primarily based on interviews with employees from operating companies, where informants represented technical specialists and middle management. Since no interviews were conducted with individuals in top management positions, the credibility and depth of the strategic perspectives and higher-level leadership considerations remain uncertain. It is likely that the data material only provides limited insight into these aspects. Consequently, the absence of top management perspectives restricts the understanding of how OSDU is anchored and prioritized at the organizational level, and how strategic decisions related to the platform are actually made.

Furthermore, the majority of informants came from the operator side, with a slight predominance of participants from one company, although representatives from other organizations were also included. While my study focused on operators within the oil and gas industry, I recognize the need for greater representation from IT vendors and possibly cloud providers to obtain a more balanced view of platforms as a phenomenon. The sample was strategically selected and based on access provided by a key informant, and although I interviewed individuals with diverse roles and backgrounds, they do not necessarily represent all voices in the industry. Capturing a comprehensive picture of the platform's role and impact across the entire ecosystem is therefore challenging. I would have particularly liked to include more IT vendors and smaller ecosystem actors in the study.

In addition, there may be methodological limitations related to the informants' ability to accurately recall past events. Retrospective accounts are susceptible to memory bias or may be influenced by how experiences are interpreted and understood in hindsight, which can affect the reliability of certain statements. The inclusion of a broader range of "well-informed informants" representing different perspectives could have helped illuminate key issues from multiple angles and thereby strengthened the study's credibility and validity (Azungah, 2018).

6.7.3 Limitations Related To Data Analysis

It is often argued that qualitative data analysis is complex, time-consuming, and labour-intensive, with limited theoretical guidance available for conducting it effectively. The process can be particularly frustrating for inexperienced researchers, especially when there are no clear guidelines on how qualitative data should be analyzed using specific methods (de Casterlé et al., 2012, as cited in Azungah, 2018). As a first-time researcher, I found the analytical phase of this study challenging, especially when it came to maintaining an overview of the coding process throughout the analysis. Experience shows that a certain degree of reflection and documentation should occur in parallel with coding, to ensure transparency and enable traceability of the analytical decisions made.

Although I took notes in some instances to explain and justify my choice of codes, I realized afterward that this should have been done more systematically. The lack of consistent documentation may have affected the transparency of the analysis, and in some cases made it difficult to reconstruct why certain codes were selected or grouped the way they were. In addition, it is important to acknowledge that my interpretation of the data may have been incomplete or influenced by my preconceptions. Even though I sought to approach the material with an open and reflective attitude, there remains a risk that some nuances or meanings were lost or overlooked during interpretation.

6.8 OSDU And Sustainability

The OSDU platform holds significant potential to contribute to sustainable development in the oil and gas industry by enabling improved data flow and collaboration across actors within the platform ecosystem. However, the findings of this study indicate that the realization of this potential is hindered by structural and organizational challenges within the ecosystem. Unless these challenges are addressed, the platform initiative risks resulting in wasted resources and a continuation of unsustainable industry practices. The following discussion examines sustainability through the three dimensions presented in Chapter 3: Sustainability.

The **social sustainability** potential of OSDU remains largely unrealized due to lack of coordination, weak strategic anchoring, and shifting responsibilities between actors. The technical functionalities provided by the platform alone are clearly insufficient to solve the industry's collaboration challenges. When actors fail to define shared goals and clear roles, their ability for collective problem-solving and mutual learning is weakened, both of which are essential components of social sustainability, particularly in inter-organizational platform ecosystems. To unlock OSDU's social sustainability potential, there must be a shared strategic direction, as well as commitment, understanding, and willingness to collaborate among actors. This dimension aligns closely with UN Sustainable Development Goal (SDG) 17: Partnerships for the Goals, which emphasizes the importance of partnerships and coordinated efforts to address complex societal challenges (FN-SAMBANDET, 2025).

OSDU's potential to enhance **economic sustainability** within the ecosystem is challenged by an unequal distribution of incentives and a lack of strategic alignment between operators and IT vendors. The complementary solutions developed by IT vendors play a crucial role in the ecosystem's economic value creation, yet vendors often perceive the benefits as unclear or unfairly distributed. This undermines their motivation to participate actively in the ecosystem. Rather than strengthening the overall economic sustainability of the ecosystem, OSDU risks weakening the position of key actors without offering compensatory gains. At the same time, operators continue to invest significant resources in the technical implementation of OSDU, often without a clear understanding of how these investments contribute to long-term value creation. Economic sustainability requires the coordinated development of business models and incentive structures that include all actors, in order to foster continued investment and engagement over time. This aligns with UN SDG 9: Industry, Innovation and Infrastructure, which emphasizes the development of inclusive, resilient, and sustainable industrial structures (FN-SAMBANDET, 2025).

In relation to **technical sustainability**, OSDU demonstrates a lack of shared understanding of its standards. Divergent interpretations and practices across actors weaken the technical interoperability between applications and systems. The resulting fragmentation undermines the platform's fundamental purpose: to function as a common, standardized system within the industry. Moreover, the continued use of OSDU requires intensive manual coordination between actors, even though such coordination was supposed to be eliminated through standardization. These challenges suggest that technical sustainability depends not only on the system's built-in functionality, but also on how the technology is used, governed, and developed in practice. Without joint efforts to adhere to standards, maintain data quality, and ensure compatibility, the technical solution alone cannot guarantee long-term sustainability. This technical dimension is particularly relevant to UN SDG 9: Industry, Innovation and Infrastructure, which calls for robust, future-oriented infrastructure, and UN SDG 12: Responsible Consumption and Production, which emphasizes efficient resource use and sustainable system management (FN-SAMBANDET, 2025; FN-SAMBANDET, 2025).

The systemic effects of OSDU

When evaluating the consequences of technologies such as OSDU, it is crucial to look beyond immediate functionalities and consider the long-term systemic effects that emerge from the interaction between technology and organization. The perspectives of Becker et al. (2016) provide a framework for this discussion, highlighting how OSDU affects collaboration, role formation, and industry practices both in the short and long term.

Immediate effects arise directly from the production, use, and replacement of software systems (Becker et al., 2016). For OSDU, this concerns the technical utility of its functionalities: standardized data formats, centralized data storage, and improved data access, as well as the environmental impact related to cloud storage and resource consumption. Since OSDU's adoption is still in its early stages, it remains difficult to determine whether these effects will materialize or to what extent the platform can be considered sustainable.

Enabling effects stem from long-term use of the system (Becker et al., 2016). In the context of OSDU, this refers to how the platform could enable better collaboration, reduced duplication of work, new workflows, and data-driven decision-making. However, these effects are potential rather than guaranteed, as they depend on actual usage, coordination, and mutual commitment among actors. Without these conditions, no enabling effects will be realized.

Structural effects refer to enduring changes observable at the macro level, influencing how actors interact, think, and organize over time (Becker et al., 2016). In the case of OSDU, these include shifts in the power balance between operators and IT vendors, new expectations regarding data ownership and collaboration, and the emergence of new governance and business models. These structural effects are central to the discussion of the strategic deadlock, as they illustrate how lack of coordination and misaligned incentives can prevent the platform from developing into a functioning ecosystem. To fully assess the long-term transformative potential of OSDU within the oil and gas industry, it is essential that this strategic deadlock is resolved.

7 Conclusion

In this master's project, I have examined how the OSDU platform challenges established collaboration models and actor roles in the oil and gas industry, with particular emphasis on the barriers that hinder the development of a functioning ecosystem. Through qualitative interviews and analysis of existing theory, I have addressed the research question: *"How does the OSDU platform challenge established collaboration models and actor roles in the oil and gas industry, and what barriers impede the ecosystem's development?"* The study highlights how the actors, particularly the operators relate to the changes that OSDU represents, both as a technological solution and as an organizational model within the industry. The analysis shows that the transition to a platform logic is not merely a matter of technological modernization, but requires extensive institutional and organizational change across actors.

A key finding is that OSDU does not function as a platform in the way it is typically described in classical platform literature, where clear ownership, central governance, and spontaneous network effects form the basis for value creation. In contrast to consumer-oriented platforms, where network effects can arise organically, value creation in OSDU depends on coordinated efforts among complex, hierarchical organizations with differing interests and legacies. Without shared governance, strategic anchoring, and incentive alignment, the theoretical benefits remain unrealized.

The lack of a shared understanding of OSDU's role and purpose among operators has led to the platform being treated as a purely technological project, rather than a strategic industry transformation. This has created a strategic deadlock, in which all actors wait for one another, and no one takes ownership of the system as a whole. The platform's potential is further weakened by the absence of mechanisms for collaboration, unclear role definitions, and incentive structures that fail to foster complementarity and mutual value creation.

The consequences are significant: instead of uniting the industry around a common standard and shared goals, OSDU risks entrenching fragmented practices behind a façade of technological modernization. This could lead to wasted investments and missed opportunities to achieve economic, social, and technical sustainability.

The findings align with recent criticism in platform literature. Kari et al. (2025) note that much of the established theory has been developed around platforms with a single owner and centralized governance, and caution that existing concepts only partially explain how network-driven ecosystems with shared ownership actually operate. In particular, there is a lack of insight into how such ecosystems are governed during their emergent phase, when governance structures are immature and power, responsibility, and value creation are unevenly distributed. The case of OSDU demonstrates that platform leadership cannot be left to technology alone. For the ecosystem to function, both technology and organizations must evolve in parallel, guided by clear coordination, commitment, and a shared direction.

Ultimately, the study shows that platforms like OSDU represent more than technological innovation, they signal a sector-wide shift in how collaboration and value creation are organized. However, if this shift is not followed by comprehensive and strategic governance, the platform will fail to realize its potential and may, in the worst case, reproduce or reinforce the very structural challenges it was intended to solve.

7.1 Further Research

This qualitative case study has provided insight into how the OSDU platform challenges established structures of governance, collaboration, and value creation in the Norwegian oil and gas industry. The findings are largely based on perspectives from major operating companies, with a predominance of informants from one organization, although representatives from other companies were also included. While this has offered deep insight into one dominant actor perspective, it has also limited the overall scope and diversity of the material.

Future research should therefore include a broader range of actors, particularly IT vendors, smaller operators, and third-party developers, to obtain a more holistic understanding of the platform ecosystem. Including multiple perspectives could shed light on how different actors perceive the platform's role, governance mechanisms, and incentive structures, and whether perceived barriers and opportunities vary depending on actor type and ecosystem position.

Another important avenue for future research concerns top management perspectives. The findings of this study suggest that weak strategic anchoring and lack of overarching leadership represent key barriers to ecosystem development. As the data primarily stems from interviews with mid-level managers and technical specialists, there is some uncertainty about how accurately it reflects the views and priorities of decision-makers at the executive level. Future studies should therefore investigate how top executives perceive, prioritize, and approach OSDU's development, and what role strategic leadership plays in shaping the platform's direction and governance model.

Furthermore, future research should examine how actors' understanding of platform value and role distribution influences their actions. The findings of this study suggest that cognitive barriers and divergent interpretations of the platform's purpose play an important role in the strategic deadlock. It is particularly relevant to investigate how an actor's organizational position, for example, whether they hold managerial responsibility, are technical specialists, or work closely with the development of OSDU shapes their perception of the platform's potential, direction, and needs. Such differences can influence expectations, priorities, and willingness to collaborate. How these expectations are formed, communicated, and evolve within a shared platform ecosystem is an issue that warrants further attention.

It would also be valuable to examine how collaboration practices and governance models evolve over time in consortium-based platforms like OSDU. As the phenomenon is relatively new and the platform is not yet fully implemented, longitudinal studies would be better suited to capture how coordination, ownership, and value creation are realized in practice. The cross-sectional approach used in this study offers a snapshot of the phenomenon, but provides limited insight into long-term dynamics.

Comparative studies of other consortium-based platform ecosystems could also provide valuable insight into which governance approaches and collaboration models actually work in practice. Such studies may contribute to developing a more refined theoretical understanding of platform leadership in complex, multi-actor ecosystems.

Finally, future research should question whether the ecosystem model, as outlined in platform theory, truly represents a sustainable form of industrial organization in the long term. OSDU illustrates that shared ownership and responsibility among many actors can create both new opportunities and serious coordination challenges. While the platform model encourages openness, flexibility, and innovation, this study shows that without clear governance and a shared understanding, such solutions risk undermining rather than supporting sustainable development. It would therefore be valuable to investigate under what conditions ecosystem-based models function effectively, and whether they are suitable as organizing principles in industries traditionally characterized by hierarchy, control, and proprietary systems.

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9 Appendix

Appendix 1: Scope: Assessment of processing of personal data

Appendix 2: Information letter and consent form

Appendix 3: Example of interview guide

Appendix 4: Code list

Appendix 1: Scope: Assessment of processing of personal data

Sikt

Vurdering av behandling av personopplysninger

Referansenummer	**Type vurdering**	**Dato**
357013	Standard	22.05.2025

Tittel
Master

Behandlingsansvarlig institusjon
Norges teknisk-naturvitenskapelige universitet / Fakultet for informasjonsteknologi og elektroteknikk (IE) / Institutt for datateknologi og informatikk

Prosjektansvarlig
Thomas Østerlie

Student
Hong Ngan Hua

Behandlingsperiode
13.10.2024 – 01.06.2025

Kategorier personopplysninger
Alminnelige

Lovlig grunnlag
Samtykke, jf. GDPR art. 6(1)(a)

> Behandlingen av personopplysningene er lovlig så fremt den gjennomføres som oppgitt i meldeskjemaet. Det lovlige grunnlaget gjelder til 01.06.2025.

Personverntjenester har vurdert endringene registrert i meldeskjemaet.

Det er vår vurdering at behandlingen av personopplysninger i prosjektet vil være i samsvar med personvernlovgivningen så fremt den gjennomføres i tråd med det som er dokumentert i meldeskjemaet med vedlegg. Behandlingen kan fortsette.

OPPFØLGING AV PROSJEKTET
Vi vil følge opp ved planlagt avslutning for å avklare om behandlingen av personopplysningene er avsluttet. I langvarige prosjekter vil vi ta kontakt hvert annet år for å minne om at eventuelle endringer må meldes.

Lykke til videre med prosjektet!

Appendix 2: Information letter and consent form

Information sheet and consent form for participation in research project

Title of the project:
Strategic deadlock in platform ecosystems: A study of the OSDU data platform

Background and purpose:
You are invited to participate in a research project that examines how platforms affect established forms of collaboration and actor roles in industries, and which organizational and strategic barriers hinder the development of a coordinated and well-functioning platform ecosystem. The study focuses in particular on how different actors understand platforms' purpose, value creation potential and need for governance.

The OSDU data platform for the exchange and management of subsurface data is used as a case in the study. The aim is to shed light on the organizational and collaborative challenges the platform attempts to address, as well as the experiences of oil and gas company employees with implementing and using OSDU in practice. Particular emphasis is placed on how stakeholders understand the role of the platform and what factors hinder or promote the development of a coordinated platform ecosystem.

What does participation entail?
Participation involves being interviewed about experiences with and perceptions of the OSDU data platform. The interview will last approximately 30-45 minutes and will be audio recorded solely for the purpose of subsequent transcription. The information collected will be used for research purposes only. The data will be stored securely and processed in accordance with applicable data protection laws and regulations (GDPR).

Data controller:
The institution responsible for processing data for this research project is the Norwegian University of Science and Technology (NTNU).

Your consent and your rights:

- Participation is voluntary, and you can withdraw your consent at any time without giving a reason. If If you withdraw, all information collected from you will be deleted.
- You have the right to access the information stored about you, as well as the right to request correction, deletion or restriction of the use of the information.
- You also have the right to data portability, which means you can receive a copy of your information.
- If you have any complaints about the way your information is processed, you can contact the Danish Data Protection Authority. (post@datatilsynet.no).

Anonymity and data storage:
All data will be treated confidentially and anonymized in the final report. Audio recordings from the interview will be stored securely and deleted after the end of the project (no later than May 31, 2025).

Contact information:
If you have any questions about the project, please contact:

Hong-Ngan Hua, master's student at NTNU

Email: hnhua@stud.ntnu.no

Tel: +47 92319519

Supervisor:

Thomas Østerlie, Associate Professor

Email: thomas.osterlie@ntnu.no

Tel: 98222181

Data Protection Officer:

If you have any questions about privacy and data processing, you can contact the Data Protection Officer at NTNU:

E-mail: personvernombud@ntnu.no

Consent:

I have received information about the project and agree to participate.

I am aware that I can withdraw from the study at any time without consequences.

Name: ____________________

Given: ____________________

Signature: ____________________________________

Appendix 3: Example of interview guide

Interview guide

Hi, thank you for taking the time to participate in my research project. My name is Hong-Ngan, and I am writing a master's thesis for the Master's program Digital Transformation at NTNU.
I am interested in the use of data platforms as a means of data exchange and interoperability, and specifically what is needed for this type of platform to be widely used internally and across companies.

To illustrate this, I will look at the introduction and use of OSDU, a data platform for exchanging subsurface data. I am particularly interested in understanding what challenges OSDU can help solve and what experiences people in oil and gas companies may have with the process of introducing and using elements of OSDU for their work tasks.

As a start, I therefore thought I would start by better understanding what experiences you have had and may still have with obtaining and using subsurface data.

1. **Current working methods and computer systems:**

• what kind of position and professional background do you have?

• What tasks do you use subsurface data for?

o What digital solutions and tools do you use in connection with work? around underground data?

• Have you experienced that limited access to underground data makes it difficult to perform your work tasks?

o What has been the problem? Do you have a specific example to illustrate?
o How did you solve this?
o How does this affect the way you can perform your work tasks? o What specifically becomes difficult when access to subsurface data is limited?

2. **Knowledge of OSDU, perceived usefulness of OSDU**

• Have you been involved in the process of testing and implementing OSDU? About no, how much knowledge do you have about OSDU?

(Explanation if they are not familiar) OSDU Data Platform is a digital platform that collects and standardizes subsurface data across archives and databases. It provides easier access and sharing of data between professional groups, reduces silo structures and improves interoperability, while facilitating more effective analysis and decision support.

• Based on the problems you have described, what functionality could you imagine in a data platform like OSDU? How do you imagine this [PLEASE SPECIFIC FUNCTIONALITY] would be of use to you?

• If OSDU can help solve these problems, what benefits do you imagine it could bring you? (If they answer vaguely, ask them to give examples)
o For example, can you work faster?
™ Are you getting better decision-making?
o Are there specific work processes where OSDU could be particularly useful?

o Do you see any advantages to having a common platform for data management?

For those who have been involved in testing and implementing it, you have to ask about the process.

- Tell us a little about the activities you have been involved in related to OSDU? What was the background to this? Was it related to any of the challenges you have mentioned?

- What is your experience with implementing OSDU among people in the company? What have been the challenges? What could you have done differently?

3. Prerequisites for successful implementation (If they don't know: Outline some scenarios for the interviewee: e.g. connecting to multiple databases, some tools with OSDU replacing the ones you have now)

- What do you think could be a way to ensure that OSDU will be widely used in the

  underground
  environment? o
  What is needed? o Do you have any examples?
  o What do you see as the biggest challenges in implementing OSDU?
  o Is there resistance to new systems and ways of working in the organization? o How should training and support be organized?

Appendix 4: Code list

Name	Description
User needs	Code what end users need and expect from the system, tools, or processes to perform their work more efficiently and with better results.
Data governance	Policies, processes and responsibilities for how data is handled, shared, quality assured and owned across systems, organisations and actors. Also includes how industry standards (such as OSDU) are promoted, and what requirements are set to ensure control, compliance and value extraction from data.
Data management	Codes related to the handling, processing and organization of data, including standardization, integration and access control.
Data complexity at scale	Addresses how the complexity of handling large amounts of data increases as the scope and variety of data grows.
Data diversity	Codes for variation in data types, sources, and structures, which makes integration and analysis more challenging.
Data quality	Codes that address the quality of the data, including accuracy, completeness, consistency, and availability.
Data delivery	Deals with how data is delivered to users or systems, including how updates and changes to the data are communicated.
Data standardization	Codes that focus on processes to standardize data collection, storage, and exchange across different systems and units.
Inconsistent naming	Refers to problems related to inconsistent naming conventions on data, which makes it difficult to find and use the data effectively.

Name	Description
Varying data definitions	Codes related to different parties may have different understandings or definitions of what different data means, leading to misunderstandings.
Data facilitation	Codes for processes that prepare and format data for further use and analysis, including data cleansing and transformation.
Data transformation	Codes that deal with the process of changing or converting data into a format that can be used in analytics or other systems.
Digitization	Refers to the transition from manual, analog processes to digital tools and systems to make data more easily accessible and more efficient to use.
Computer automation	Codes for processes where data management and -processing occurs automatically, without the need for manual intervention.
OSDU	Codes referring to the Open Subsurface Data Universe (OSDU), an open platform for managing and exchanging subsurface data in the oil and gas industry.
Data definition	Is about how data is defined, categorized and structured to ensure consistency and understanding across systems and users.
Current OSDU status	Codes that address the current state and implementation of the OSDU platform in the organization or industry.
OSDU as a solution	Is about how OSDU is used as a solution for data management and decision making in the oil and gas industry.
Application Enhancements	Codes related to how applications can is being improved to better support user workflow and increase data processing efficiency.

Name	Description
OSDU Success Factors	Codes that identify critical factors for successful implementation and use of OSDU in the oil and gas industry.
OSDU experiences	Codes that deal with experiences, both positive and negative, related to the use of the OSDU platform in industry.
Reference data for interpretation	Codes related to the use of standardized reference data used to interpret and compare different data sets in OSDU.
Outsourcing	Refers to processes where organizations outsource certain functions or services to external providers, including data management.
Supplier dependency	Barriers that arise when data types and systems are locked to specific vendors, which hinders flexibility and innovation.
Underground data	Codes that refer to data related to geological and geophysical conditions below the ground, including well and production data.
Well data management	Codes for processes involving the collection, storage, and processing of well data in the oil and gas industry.
Well data type	Codes that address the different types of well data collected during drilling operations, such as pressure, temperature, and depth.
Log data type	Codes that refer to log data collected during the drilling process, such as borehole information and seismic measurements.
Core samples	Codes related to sampling rocks and fluids from subsurface resources for analysis and interpretation.
Mudlogs	Refers to log data collected during the drilling process, specifically related to the drilling fluid and its properties.

Name	Description
Rock and fluid	Codes for data related to geological samples (rock) and fluids (oil, gas, water) collected during drilling operations.
Data ownership	Who owns and has rights to data, as well as how this is managed, especially in the context of sharing and quality assurance.
Data management	Codes for processes and tools used to organize, store and retrieve data in the oil and gas industry.
Data integration	It is the process of connecting data from different sources or systems to provide a holistic picture of the information.
Datatap	Codes that refer to data loss due to technical errors, failure to store, or other factors.
Lack of data retention	Codes related to problems with preserving data over time, either as a result of poor storage or lack of follow-up.
Manual data flow	Codes for processes where data is processed or transferred manually, without automation, which can lead to inefficiencies and errors.
Computer products	Used to code quotes that describe data as a finished and reusable product delivered to the business – not just as raw data, but as a structured and consumable entity.
Decentralized data practices	Codes for situations where data is stored and handled in different locations or by different teams, without a centralized structure.
Data silos	Refers to situations where data is isolated in separate systems or departments, preventing effective sharing and integration.
Data access	Codes related to the process of accessing the data, including challenges related to authorization and availability.

Name	Description
Domain-dependent data processing	Codes that refer to data being processed differently based on use, subject area or application.
Fragmented solutions	Codes for situations where data solutions are divided into different systems and platforms that do not work well together.
Data tracking	Codes that refer to the process of tracing data back to its origin, as well as following its development and changes.
Cross-company collaboration	Codes referring to the collaboration between different companies to share data, resources or technology.
Change management	Codes that deal with the processes for managing changes in the organization, especially related to new technological solutions such as OSDU.
Adoption	Codes related to how new systems, technologies or processes are adopted by employees and organizations.
Work processes	Codes that refer to how work processes are performed.
Decision-making and information flow	Codes that deal with decision-making and information flow in the context of OSDU
Existing work processes	Describes codes that talk about current work processes
Changes in processes	Describes codes that deal with how work processes are changed by OSDU
Tool use in project work	Codes for how tools are used in project work, and how these can change the workflow in projects.
Resistance to change	Codes that address the resistance employees may resist changes in work processes or technology.

Name	Description
Change strategies	Codes for strategies used to manage change, including approaches to overcoming resistance.
Professional communities	Codes for specific professional communities, such as geophysicists or petrophysicists, and how these are affected by changes in work processes and technology.
Change agents	Codes for people or groups responsible for driving change processes in the organization.
Incentives	Codes referring to motivation and reward systems to encourage employees to adopt new technologies or work methods.
Business model	Tags discussing business models
Communication	Codes for how information about changes or new solutions is communicated to different groups in the organization.
Transition	Used to code quotes that describe how a transition from old to new systems occurs, especially when this happens technically or gradually without major changes in the user's work process.
Interdisciplinary collaboration	Codes that deal with cooperation between different disciplines to solve challenges across the organization.
Involvement	Codes for how employees or users are involved in change processes or new initiatives, and how engagement can affect success.
Time and resource constraints	Codes for challenges related to time and resources that affect the implementation or use of new systems.
Historical data	Used for codes that talk about historical events within the oil and gas industry

Name	Description
Interoperability	Codes that deal with how different systems and technologies can communicate and work together across organizations and platforms.
Format variation	Refers to variations in data formats that can occur when data is exported, imported, or converted between different systems or applications, and they lead to challenges in interoperability and data management.
Competence needs	Codes relating to reflections on competence needs
Organizational silo thinking	Codes that refer to how organizations operate in isolated units or departments, which hinders information sharing and collaboration.
Organizational resources	What kind of resources are needed (people, expertise, structure, finances)
Platform architecture	Codes referring to platform architecture
Regulation and compliance	This code is used to collect citations and data that address statutory requirements, regulations, and regulatory aspects that impact the implementation of technology solutions such as OSDU. It focuses on how external requirements and regulatory barriers can create challenges or drivers in digitalization, data standardization, and platform adoption.
Stakeholder management	Codes that deal with reflections on stakeholder management

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