

MASTER'S THESIS

Challenges of platform-based ecosystems

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Challenges of platform-based ecosystems

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Abstract

Platform-based business ecosystems (PBEs) are a rising phenomenon, fuelled by business digitalization and evolution of information technology. Current scientific literature discusses several challenges encountered in the PBE environment, but a comprehensive overview of these challenges seems to be missing. The timely identification of a challenge will support practitioners in their choices regarding PBE development or adoption. The aim of this study is to create an overview of PBE challenges and validate these, potentially offering refinement from practice. To this end, first a systematic literature review is conducted, to create an overview of challenges experienced in the PBE environment, where six main categories of challenges were identified: Architecture, Competition, Ecosystem Governance, PBE Innovation, PBE Phenomena and Specifics of business model. Hereafter, the overview is validated by conducting a single case study in which semi-structured interviews are held with various actors within a mature business-to-business application PBE. Finally, this research provides an empirical validation of majority of the challenging aspects in the overview, leaving paths for further research.

Key terms

Platform ecosystem, challenge, digital ecosystem, overview

Summary

Currently, in the context of business digitalization, the constant evolution of information technology and a global pandemic as an accelerator - digital platform-based business ecosystems (PBEs) gain an increasing momentum in the B2C and B2B markets. Due to the still-emerging nature of the PBE phenomenon, several aspects of it are in lack of systematic research and standardization, one of these aspects are the challenges of PBEs. The timely identification and understanding of a challenge within a PBE, has proven to be able to make a difference between success and failure. Authors mostly address from one to a selection of few PBE challenges, the larger scope remains undocumented.

In practice, a framework of challenges will support platform owners, app developers, and future consumers in market orientation and enable them in making better-informed decisions regarding PBEs. The exploration of challenges faced by PBEs has the potential to support and argue specific design, architecture, or governance choices made by platform owners, multi-homing and “lock-in” related decisions by contributors or consumers.

The objective of this study is to identify challenges faced by PBEs by conducting a systematic literature review, synthesize the available literature on challenges of PBEs in one comprehensive overview and evaluate the overview validity and refine it in practice.

The following research question has been defined to achieve this objective:

What would a comprehensive overview for challenges of platform-based business ecosystems look like?

To answer the main research question, a set of sub-questions have been developed and the answer of each of these will contribute to the completion of the main research question and the research objective.

Sub question 1: What are the challenges faced by PBEs in the literature?

Sub question 2: How can an overview be developed based on the challenges found in previous research and what would it look like?

Sub question 3: Are the classified challenges for PBEs relevant in practice?

Sub question 4: How can the proposed overview of challenges of PBE be refined with practical information?

To answer the above questions, a systematic literature review was conducted producing an overview with 6 categories of PBE challenges, divided into 27 sub-categories. The categories and the subcategories they contain are following: category of Architecture (Interoperability, Customization, Modularity and fragmentation), category of Competition (Competitive thinking, Assimilation, Balancing competition and collaboration, Dominance), category of Ecosystem Governance (Control, Coordination, Data Management, Ecosystem relations, Effectiveness of governance, Ethical challenges, Finance, Regulatory), category of PBE Innovation (Evolution, Legitimacy, Platform dynamics, Platform properties, Platform/functionality start-up phenomena), Specifics of business model (Collaborative consumption, Local challenges, Market dynamics, User organizations).

To evaluate the proposed overview in practice, a case study was performed in a B2B setting of PBE environment. A number of semi-structured interviews with various actor types were conducted, to validate the challenges and create a deeper understanding of their relevance. To increase the value

of the overview for practitioners, the interviewees were asked to provide solutions. These outcomes were collected and presented alongside the final overview of PBE challenges.

As a result of the empirical validation, majority of the challenging aspects were validated and refined from practical experience. The most prominent of all challenge categories was established to be Ecosystem governance, followed by Specifics of business model, closely followed by the resulting categories. However, not all challenging aspects were shown to be relevant for this case study, comprised of a mature (as opposed to an emerging) B2B PBE environment. Collaborative consumption challenges could not be validated, given that it requires a collaborative consumption PBE. Several other challenging aspects could not be validated - in category Dominance, the challenge to become the dominant platform, in category Competition - the challenge of competitive thinking during formation of the PBE, which leads us to conclude, that the relevance of these challenges is dependant also on the maturity state of the PBE. This leaves open avenues for further research and validation, in order to complete and further enhance the overview of PBE challenges.

Finally, relevant observations are presented, to support platform owners, app developers, and future consumers in market orientation and enable them in making better-informed decisions regarding PBEs.

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1. Introduction

1.1. Background

Currently, in the context of business digitalization, the constant evolution of information technology (Hein et al., 2019) and a global pandemic as an accelerator - digital platform-based business ecosystems (PBEs) gain an increasing momentum in the B2C and B2B markets. This can be witnessed by the stock price growth in 2020 of such platform owners as Amazon, Microsoft, SAP, and Facebook.

PBEs are also an emerging research subject (M. de Reuver, Sørensen, & Basole, 2018), they distinguish themselves by their digitality (M. de Reuver et al., 2018; Senyo, Liu, & Effah, 2019) and platform-base.

From a sociotechnical perspective, a platform-based ecosystem consists of the platform (Gawer, 2014), contributors, and consumers/customers/end-users (Hein et al., 2019; Tiwana, 2014). Platform leaders according to Gawer and Cusumano (2014, p. 423), are “organizations that successfully establish their product, service, or technology as an industry platform and rise to a position where they can influence the trajectory of the overall technological and business system of which the platform is a core element”. Another characteristic part of PBE is the complementor – an independent third party (M. de Reuver et al., 2018; Hein et al., 2019; Tiwana, 2014), that adds value by adding modular, complementary, and innovative services on top of the platforms core function. As a result of ecosystem development, a platform owner will find themselves not only managing in-house products, but instead focusing on governance of the ecosystem (Foerderer, Kude, Schuetz, & Heinzl, 2018) – which widens the spectrum of encountered challenges.

The timely identification and understanding of a challenge within a PBE have proven to be able to make a difference between success and failure (Gawer & Cusumano, 2014). Digital PBE's have been assigned various complex opportunities and challenges – organized sometimes in categories of business and technical issues, conceptualization, and artifacts (Senyo et al., 2019), actor perspective (M. de Reuver et al., 2018; Müller, 2019; Tiwana, 2014) and technical properties or components (Tiwana, 2014; Tiwana, Konsynski, & Bush, 2010). The differences in these categories are evidence of disagreement in the current literature.

In practice, the framework of challenges will support platform owners, app developers, and future consumers in market orientation and enable them in making better-informed decisions regarding PBEs. The exploration of challenges faced by PBEs has the potential to support and argue specific design, architecture, or governance choices made by platform owners, multi-homing and “lock-in” related decisions by contributors or consumers (Saunders, Lewis, & Thornhill, 2016). After all - a contribution is made to the overall success of the platform by addressing these challenges strategically (Foerderer et al., 2018; Tiwana, 2014).

This study aims to systematically review the challenges of PBEs in scientific literature and present a comprehensive overview for a deeper understanding. It also attempts to validate the designed overview in practice in the Business-to-Business PBE environment. In this use case a PBE is utilized, which consists of a software core with modular services, and contains the main identified actors – platform owner, complementors, and users. Because of this, it represents a relevant case for this study.

1.2. Exploration of the topic

A digital platform is a software-based platform that provides a core functionality (Gawer, 2014; Hein et al., 2019; Tiwana, 2014). The platform is designed with a stable technological core, with modular architecture in mind (Gawer & Cusumano, 2014). Complementors add their modular products or services, using open interfaces (M. de Reuver et al., 2018; Gawer & Cusumano, 2014; Hein et al., 2019; Tiwana, 2014), and consumers are attracted by these complimentary, additional products and services and vice versa (Hein et al., 2019) – the latter is also described as “network effects” (Gawer,

2014; Gawer & Cusumano, 2014). It is this moment when the platform grows into a platform ecosystem. The modularity fosters innovation (M. de Reuver et al., 2018; Gawer, 2014; Hein et al., 2019), but can also be limited by the governance approach of the platform ecosystem (Hein et al., 2019). In this context, we understand the term “platform”, as a digital platform serving a multi-sided market (Tiwana, 2014) – similar to what has been earlier described as industry platforms (Gawer, 2014). A PBE can have different types of governance, which mainly are centralized, based on consortia, decentralized (Hein et al., 2019).

A challenge in the context of a PBE is understood as a situation, which is testing the platforms or their actor’s ability, inviting for a contest, and demanding special effort, to succeed (Dictionary.com, 2020; Press, 2020). It constitutes a phenomenon or behavior of PBE/the market/involved actors, which requires a (counter)action from an involved entity, to avoid undesirable outcomes or to reach desirable outcomes.

So far, several of challenges have been identified, such as governance-related (M. de Reuver et al., 2018; Müller, 2019; Senyo et al., 2019), coordination and interaction (M. de Reuver et al., 2018; Lenkenhoff et al., 2018; Müller, 2019) and integration and interoperability challenges (Lenkenhoff et al., 2018; Senyo et al., 2019; Tiwana, 2014).

1.3. Problem statement

Due to the still-emerging nature of the PBE phenomenon (Gawer, 2014; Senyo et al., 2019), several aspects of it are in lack of systematic research and standardization (Müller, 2019), one of these aspects are the challenges of PBEs. The timely identification and understanding of a challenge within a PBE, has proven to be able to make a difference between success and failure (Gawer & Cusumano, 2014). Authors mostly address from one to a selection of few PBE challenges, the larger scope remains undocumented.

However, no literature source provides a comprehensive view of all challenges faced within a PBE and seems to be missing (Müller, 2019). A systematic review and analysis of challenges faced by PBE could offer further insights on PBE development and open new research avenues.

A comprehensive overview of challenges faced by and within the PBEs is not available up to date - therefore systematic research on identifying challenges of PBEs is required.

1.4. Research objective and questions

The objective of this study is to identify challenges faced by PBEs by conducting a systematic literature review, synthesize the available literature on challenges of PBEs in one comprehensive overview and evaluate the overview validity and refine it in practice.

The following research question and sub-questions have been defined to achieve this objective:

What would a comprehensive overview for challenges of platform-based business ecosystems look like?

To answer the main research question, a set of sub-questions have been developed and the answer of each of these will contribute to the completion of the main research question and the research objective.

Sub question 1: What are the challenges faced by PBEs in the literature?

The first step was to identify challenges faced by PBEs, which have been described in research literature. This has been done employing a systematic literature review.

Sub question 2: How can an overview be developed based on the challenges found in previous research and what would it look like?

Once the literature was analyzed and coding performed, an attempt was made to create an overview.

Sub question 3: Are the classified challenges for PBEs relevant in practice?

The overview of PBE challenges will be validated in practice, existence of a challenge is perceived as relevance. To provide deeper understanding, interviewees will be asked to describe the challenge in the setting of their PBE.

Sub question 4: How can the proposed overview of challenges of PBE be refined with practical information?

To evaluate the proposed overview in practice, a case study was performed in a B2B setting of PBE environment.

1.5. Motivation/relevance

Recently a high-profile lawsuit, where a game publisher sues two large PBE owners for anti-competitive practices and the high charges on in-app purchases (Van Boom, 2020) became public. This case highlights numerous challenges of PBEs, such as governance application to competition and contribution practices, risk-sharing among members (M. de Reuver et al., 2018; Gawer & Cusumano, 2014; Senyo et al., 2019) and actor relationship management (Müller, 2019). Timely identification and better understanding of such challenges might support PBEs in avoiding negative publicity. This specific lawsuit has the potential of influencing the platform owner – contributor dynamics for a multi-billion market (Sherr, 2020) and illustrates the relevance of the challenges of PBEs.

Also, historically there are examples, which illustrate the relevance of timely identification of a challenge: Sony's failure to address the challenge of openness in collaboration with partners, the failure of Nokia to tackle the challenge of making alliances and developing new business models (Gawer & Cusumano, 2014), especially from the platform leader perspective.

PBE is a phenomenon that can enhance value creation in industries and therefore a valuable research topic. The understanding of the challenges faced by PBEs will support platform owners, app developers, and future consumers in market orientation and enable them in making better-informed decisions regarding PBEs. The exploration of challenges faced by PBEs has the potential to support and argue specific design, architecture, or governance choices made by platform owners, multi-homing and "lock-in" related decisions by contributors or consumers (Saunders et al., 2016). The conclusion is that comprehensive research on PBE challenges seems to be missing (Müller, 2019). A systematic review and analysis of challenges could offer further insights on PBE development and open new research avenues.

1.6. Main lines of approach

The remainder of the report consists of chapters 2 to 5. Based on the design research approach, a theoretical framework will be developed in Chapter 2., following a systematic literature review method. This chapter describes the research approach, implementation, results, and conclusions, just as well as the objective of the follow-up research are discussed.

Chapter 3 concerns methodology for the empirical research part - a case study, concerning a business software application ecosystem in the setting of business-to-business environment. The case study is used to validate the overview and possibly refine it. This section contains the conceptual and technical design, data analysis, and reflection. The concluding part presents the research results, followed by discussion, conclusions, and recommendations for future research.

2. Theoretical framework

2.1. Research approach

The purpose of the first part of the research is to identify challenges of PBEs in scientific literature and synthesize their content into a comprehensive overview, which was achieved with the help of a systematic literature review (SLR).

The question, that should be answered from scientific literature was the following:

What are the challenges faced by PBEs in the literature?

To identify challenges of PBEs and build an overview (Kitchenham & Charters, 2007) we opted to use SLR, which is “A form of secondary study that uses a well-defined methodology to identify, analyze and interpret all available evidence related to a specific research question in a way that is unbiased and (to a degree) repeatable” (Kitchenham & Charters, 2007, p. vi). The SLR was selected because it provides a well-documented methodology for identifying, reviewing, and synthesizing relevant studies, which can be appraised and replicated by other researchers (Dyba, Dingsoyr, & Hanssen, 2007; Kitchenham & Charters, 2007; Tranfield, Denyer, & Smart, 2003). An appropriate use of the method will support the construction of a generalizable overview (Dyba et al., 2007). Alternatively, a Narrative literature review could have been used, but it has a disadvantage of not following a method for ensuring quality and search documentation (Demiris, Oliver, & Washington, 2019), therefore presenting an issue with bias, replicability, and quality of the findings (Tranfield et al., 2003).

The SLR is not always able to identify or remove bias present in the primary studies (Kitchenham & Charters, 2007), but with its help, the bias can be removed from the method of study selection. This can be achieved by performing a quality assessment according to selected criteria.

2.1.1. Literature search

In search for literature sources, according to the building block method, the following Boolean search string was used: (Challenge OR issue OR problem OR barrier) AND (Platform ecosystem OR digital business ecosystem OR digital platform OR software platform ecosystem). The abstract of each source was searched, as the title may be formulated in a way, that does not include the defined search phrases. We used the OU University online library, as it provides the possibility to search multiple databases simultaneously.

The inclusion and exclusion criteria are available in Table 1: Selection criteria for literature sources.

Table 1: Selection criteria for literature sources

Inclusion criteria	Exclusion criteria
Peer-reviewed article	Articles not available in the digital environment
Written in the English language	PBE defined differently
The main focus of the study is on the digital platform, its challenges	Unclear study design or research aim
Publishing time of the source is between 2010 – 2020	Inadequate documentation of the research process
	Conclusions not traceable to the data

The fields of research, where PBE can be the focus of studies were selected to be Agriculture; Business; Computer Science; Economics; Education; Engineering; Medicine; Public Health, and Social Science.

2.1.2. Content analysis

Because current literature is not in agreement about the challenges faced by PBEs, an inductive content analysis was performed. The approach model of Elo and Kyngäs (2008) was adopted, where during the preparation phase the unit of analysis is selected, and sense is made of the data as a whole (See Figure 1: Preparation, organizing and resulting phases in the content analysis process).

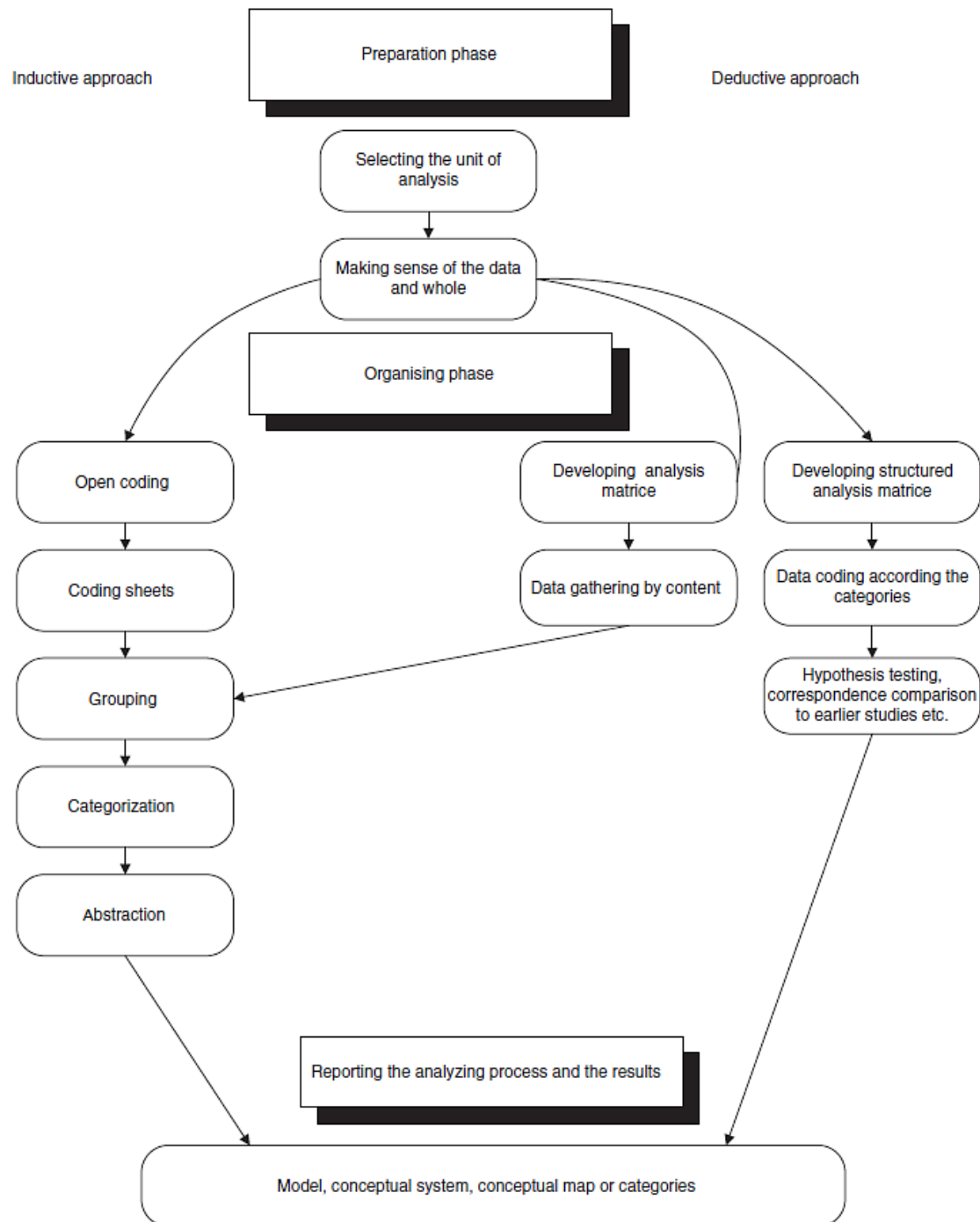


Figure 1: Preparation, organizing and resulting phases in the content analysis process

The advantage of this analysis method is, that it is well suited for qualitative analysis of multifaceted phenomena (Elo & Kyngäs, 2008). Disadvantages of inductive content analysis, compared to

statistical analysis, is the lack of standardized guidelines and dependence on the skill and option of the investigator. This implies difficulty in assessing the correct application of the method (Elo & Kyngäs, 2008).

The selected unit of analysis for coding was the identified challenging phenomenon, including a reasonable amount of given context. Open coding was done by identifying these in the text and marking them by assigning a code to each – either a short, condensed description or a specific term, if it has been identified in the literature already, e.g., the “chicken and egg problem”. The codes were then extracted and implemented in the data extraction and quality assessment table (see paragraph 2.1.3. Data extraction and quality assessment).

After this, the codes were arranged in sub-categories, based on the similarities of the represented challenges, for example: both codes Degree of control and Control design were grouped in the sub-category Control. Sub-categories were organized in categories according to abstracted thematic similarities, which lead to the construction of the complete overview of challenges. For example, the sub-categories Control and Ethical challenges both belong to the overarching category of Ecosystem Governance. The process of assigning sub-categories and categories to the codes was iterative, revisitation of the data allowed for a deeper understanding of the phenomena.

A full list of units of analysis per literature source and the resulting codes and (sub-) categories can be found in Appendix 3: SLR Coding and data extraction.

2.1.3. Data extraction and quality assessment

Data extraction was performed after the open coding step, simultaneously with the quality assessment, see template in Appendix 5: SLR template data extraction and quality assessment. A data extraction and quality assessment table were created for this purpose. Several relevant questions were selected from the Quality Checklists by Kitchenham and Charters (2007) and included in the data extraction table. The quality assessments of selected studies can be found in Appendix 2, the acceptable range being moderate to well.

Data extraction was performed by reading the qualifying literature and retrieving from it the identified challenges/codes, author, simultaneously evaluating the answers to the quality assessment questions for each article.

During this step it became apparent, that each challenge can additionally be characterised by the actor perspective (Altman, 2017; Hein et al., 2019; Tiwana, 2014). It manifests itself in the fact, that not all challenges are universally applicable to all of its actors (Müller, 2019) and therefore it was decided to additionally note the actor perspective per challenge during the coding and data extraction process.

2.2. Implementation

The initial search produced 345 scientific articles. The information flow (Moher et al., 2009) can be viewed also in Figure 2.

The next step was to review the titles and abstracts, to exclude articles, which do not focus on the digital platform and its challenges. This resulted in articles being marked as follows: 293 with No (Excluded), 40 with Yes (included), and 12 with Doubt (where title and abstract did not provide conclusive decision and full-text analysis is required).

After a full-text review of the 52 articles with Yes and Doubt markings, a final selection of 23 articles was made, based on the exclusion criteria. The full list of articles and their statuses can be found in Appendix 1: SLR articles.

After article selection, open coding was performed on identifiable challenges per article, resulting in 92 codes/challenges in total.

Organizing the challenges based on similarities of the challenges– resulted in 27 sub-categories. To provide a comprehensive thematic overview, sub-categories were organized based on thematic similarities in 6 categories (see Table 2: PBE challenge overview).

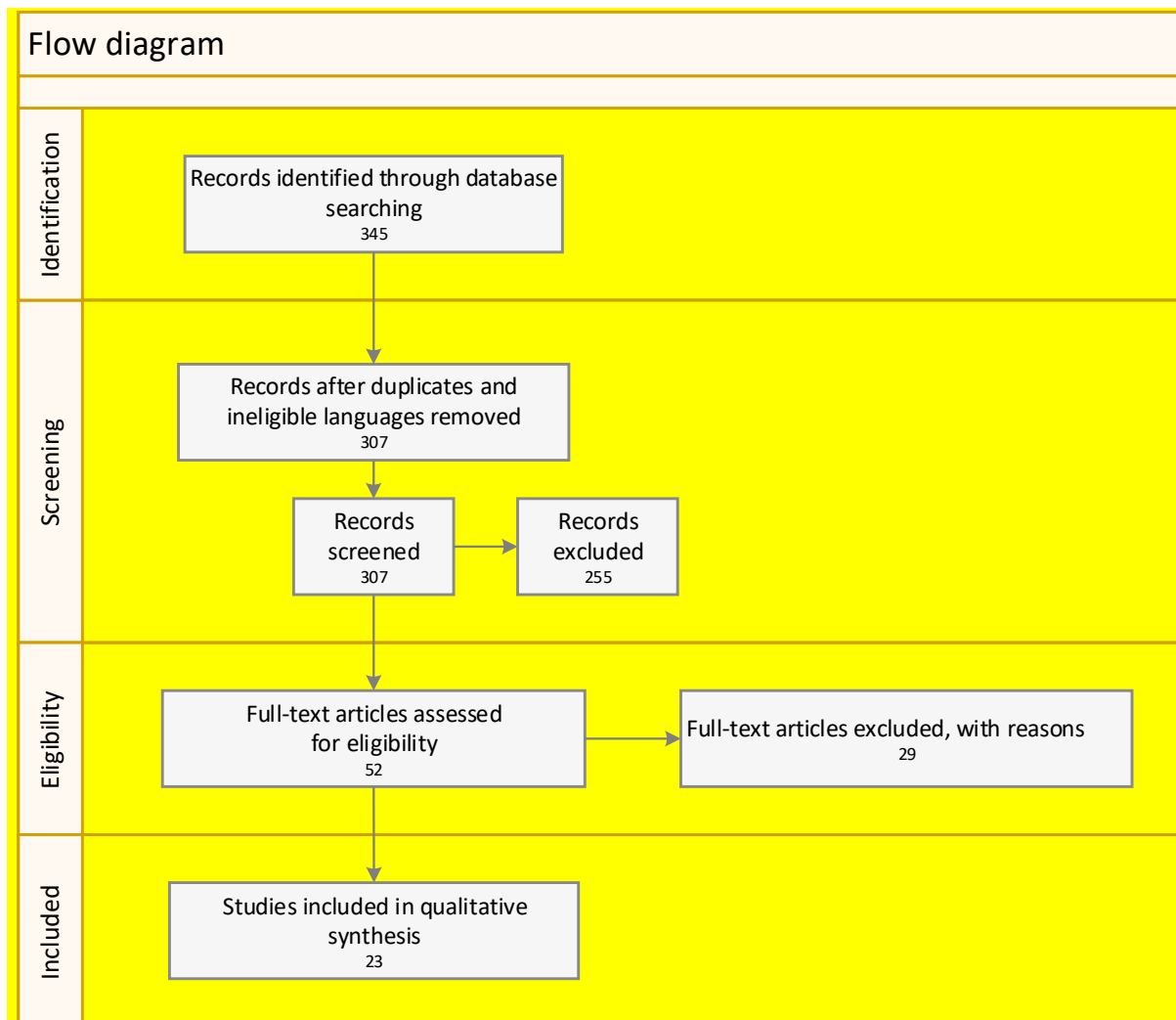


Figure 2: Prisma flow diagram for information flow on systematic reviews

2.3. Results and conclusions

To answer Sub question 1: What are challenges faced by PBEs in the literature – 92 challenges are identified from the literature. The challenges, synthesized into sub-categories with descriptions and thematically organized into categories, can be reviewed in Table 2: PBE challenge overview. The detailed list of challenges, sub-categories, and categories can be reviewed in Appendix 3.

To answer Sub question 2: How can an overview be developed based on the challenges found in previous research and what would it look like?

The identified challenges were grouped into 27 sub-categories, which were then organized into six categories based on thematic similarities, leading to the overview of challenges of PBEs – see Table 2.

The PBE challenges identified in the literature closely coincide with the defining concepts of the PBE phenomenon: modularity of the architecture (Gawer & Cusumano, 2014) and the innovation concluding from it (M. de Reuver et al., 2018; Gawer, 2014; Hein et al., 2019), interoperability (M. de Reuver et al., 2018; Gawer & Cusumano, 2014; Hein et al., 2019; Tiwana, 2014), “network effects” (Gawer, 2014; Gawer & Cusumano, 2014) and the effects of governance (Hein et al., 2019).

The overview shows the focus (most numerous challenges) of PBE related literature on governance challenges and challenges related to specific PBE phenomena, such as evolution, legitimacy, platform properties, and start-up phenomena (see Figure 3).

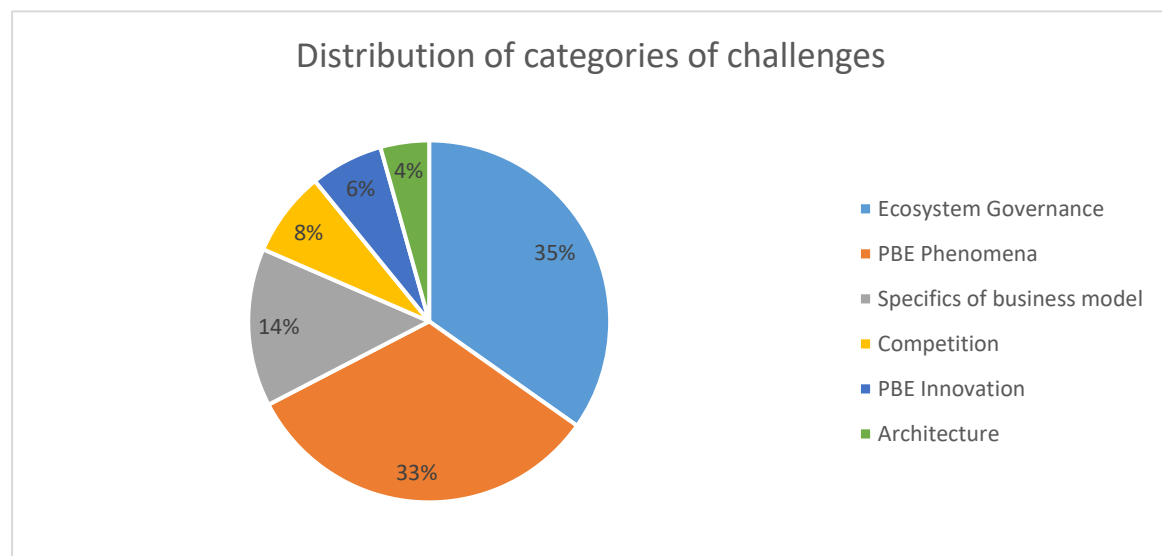


Figure 3: Distribution of categories of challenges in the SLR

The amount of Ecosystem Governance and PBE Phenomena related challenges might be an indicator for the most relevant topics in the PBE literature.

To give an indication of which challenges are relevant for different actors of a platform ecosystem (i.e., platform user, platform owner, complementor) and in which proportion, the categories were mapped against the actor types (see Figure 4).

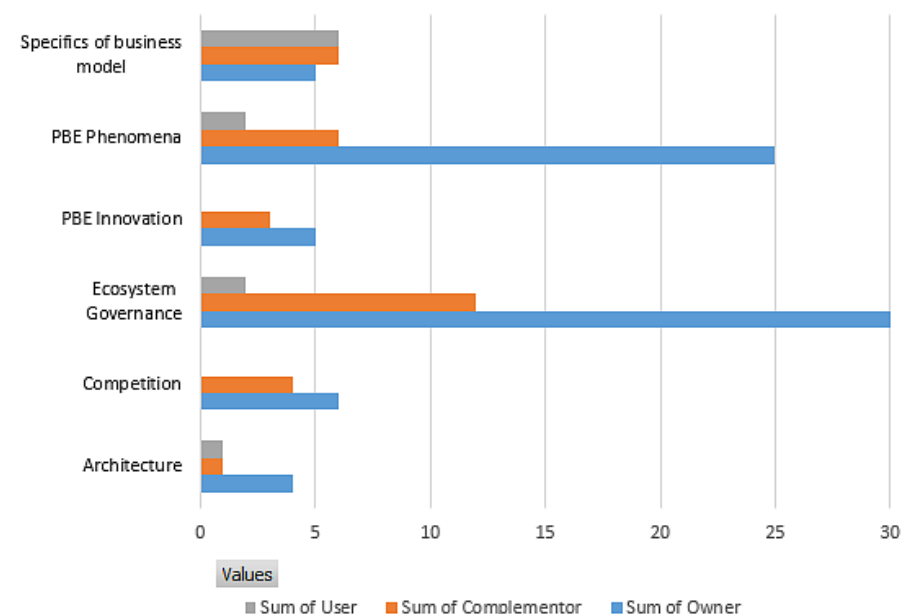


Figure 4: Overview of categories of challenges faced by different actors

Table 2: PBE challenge overview

Category	Subcategory	Description	References
Architecture	Interoperability	Interoperability issues related to various technologies and vendor applications.	Khanagha, Ansari, Paroutis, and Oviedo (2020)
	Customization	Customization issues, such as software development on top of the platform, with positive (e.g., increased ease of use for a specific purpose) and negative (future migration/technology update complications) consequences.	Rolland, Mathiassen, and Rai (2018)
	Modularity and fragmentation	Standardized interfaces enable 3rd parties in autonomous innovation, carrying the risks of unpredictable modular evolution, fragmentation, and high variance. This can endanger the user experience and overall system integrity.	Hilbolling, Berends, Deken, and Tuertscher (2019)
Competition	Competitive thinking	Competitive thinking as a challenge during the formation of PBE and resistance from other ecosystem members against the development of cospecialised assets.	Garud, Kumaraswamy, Roberts, and Xu (2020), Müller (2019)
	Assimilation	Challenge of assimilation of application into the core platform if the value propositions of each are too similar or if the application has a very attractive value proposition.	Hevner and Malgonde (2019)
	Balancing competition and collaboration	Challenge to balance competitive and collaborative behaviors between the platform owner and complementor, resistance caused by misalignment or too strongly (perceived) dominance by one of the actors.	Hilbolling et al. (2019), Khanagha et al. (2020), van Angeren, Alves, and Jansen (2016)
	Dominance	Challenge to become a dominant platform.	Khanagha et al. (2020)
Ecosystem Governance	Control	Challenges related to exercising of control, the degree of control on the PBE and the effectiveness of the control, creation of conscious control mechanisms, and involvement of all actors in this creation.	G. A. de Reuver, Robbins-van Wynsberghe, Janssen, and van de Poel (2020), Han (2020), Hevner and Malgonde (2019), Hilbolling et al. (2019), Müller (2019), Scholten and Scholten (2011)
	Coordination	The challenges related to coordination, are the fact that it requires high effort such as the creation of interfaces, contract design, creation of a common vision and strategy. A challenge is also adequate management of relationships between PBE actors.	Müller (2019), Scholten and Scholten (2011)
	Data Management	Challenges, related to Data Governance and Management are loss of confidential information, data ownership and the rights to use it, and information asymmetry (mainly between the platform owner and the complementor).	Müller (2019), Scholten and Scholten (2011)

	Ecosystem relations	Uncertainty about the functionality of the innovations, personal safety, and privacy. Uncertainties regarding the performance of actors. Lack of and building of trust and transparency. Actors' dependence on the PBE for income or preference to remain independent. Insufficient understanding of actor collaboration mechanisms.	Hazée et al. (2020), Hildebrandt, Hanelt, and Firk (2018), Mukerji and Roy (2019), Müller (2019), van Angeren et al. (2016)
	Effectiveness of governance	Realisation of effective platform governance	Han (2020), Hilbolling et al. (2019), van Angeren et al. (2016), Yi, He, and Yang (2019)
	Ethical challenges	Actors (in collaborative consumption) might question the morality of the PBE practices (e.g., lower wages, more time pressure, less job security, asocial working hours), or the PBE and its services might conflict with an actor's previous experience, social values, and usage patterns.	Hazée et al. (2020)
	Finance	Challenges related to reaching of financial viability	Khuntia, Mithas, and Agarwal (2017), Mukerji and Roy (2019)
	Regulatory	Issues related to piracy, data privacy and protection, physical safety, surge pricing, and tariff issues. Regulatory issues also manifest with regards to better work norms and working conditions. In some cases, market dominance might prove to be a legal liability for PBEs.	Mukerji and Roy (2019), Van Dijck, Nieborg, and Poell (2019), Geneviève et al. (2019), Miric and Jeppesen (2020)
PBE Innovation	Innovation acceptance	Innovation acceptance related challenges not only refer to the perceived difficulty associated with the understanding and usage of the innovation but also with its accessibility and the organization of the transaction.	Hazée et al. (2020)
	Innovation roadblock	Challenges related to blocked innovation due to the high amount of complementor connections.	Hilbolling et al. (2019)
	PBE/product innovation	Challenges related to the innovation of the core platform, its value proposition, addition of novel extensions. This includes also challenges related to the perception of the PBEs innovation state and capabilities, such as its network size, customer support quality.	Hazée et al. (2020), Hevner and Malgonde (2019), Scholten and Scholten (2011)
PBE Phenomena	Evolution	Challenges related to the ability of the complementors to adjust and coexist with the evolution of the core platform, the alignment of their goals. Challenges related to the platform owner's ability to adjust to the evolution of the ecosystem, the need to stimulate evolution.	Hevner and Malgonde (2019), Scholten and Scholten (2011), Rolland et al. (2018), van Angeren et al. (2016)
	Legitimacy	Challenges related to the PBEs cognitive legitimacy, socio-political legitimacy, or the lack thereof.	Garud et al. (2020), Khanagha et al. (2020), Mukerji and Roy (2019)

	Platform dynamics	Challenges related to the lock-in phenomenon, and platform openness.	Khanagha et al. (2020), Rolland et al. (2018), van Angeren et al. (2016)
	Platform properties	Challenges related to network effects (positive or negative) and multi-homing.	Garud et al. (2020), Hein et al. (2019), Korhonen et al. (2017), Rolland et al. (2018)
	Platform start-up phenomena	Challenges related to the "chicken and egg" problem, lack of adoption, and problems of assembly of initial membership. Further challenges are related to the need for awareness of the PBE and various collaborations and finding adequate partners for it.	Garud et al. (2020), Hazée et al. (2020), Hein et al. (2019), Khanagha et al. (2020), Kim (2018), Mukerji and Roy (2019), Müller (2019), Veisdal (2020)
Specifics of business model	Collaborative Consumption	Challenges related specifically to the collaborative consumption business model, such as the refusal of actors to participate, the contamination barrier, the image barrier, and the responsibility barrier. Additionally, also challenges related to conflicts of interest created by offering services/products already offered by the (local) government.	Hazée et al. (2020), Hildebrandt et al. (2018)
	Local challenges	Challenges related to a specific local situation: low technology penetration level, inadequate infrastructure, low level of disposable income.	Mukerji and Roy (2019)
	Market dynamics	Challenges related to the high dynamism and unpredictability of the market of the PBE.	Kabakova, Plaksenkov, and Korovkin (2016), Khanagha et al. (2020)
	User organizations	Challenges related to the PBE application in User Organisations: technology use inertia, platform management in the organization, and the challenge to develop the correct options.	Rolland et al. (2018)

According to Figure 5, the dominating perspective in literature is the owner perspective, which amounts to 64% of all identified challenges, followed by the complementor perspective of 27% and as last – the user perspective at only 9%.

This could be a true reflection of the situation, but it could also illustrate researcher bias in topic selection and availability of information. Similar trends can be observed in existing prominent PBE research, such as in the book by Tiwana (2014), where the main discussed subjects are governance, architecture, platform evolution - mainly from the owner perspective.

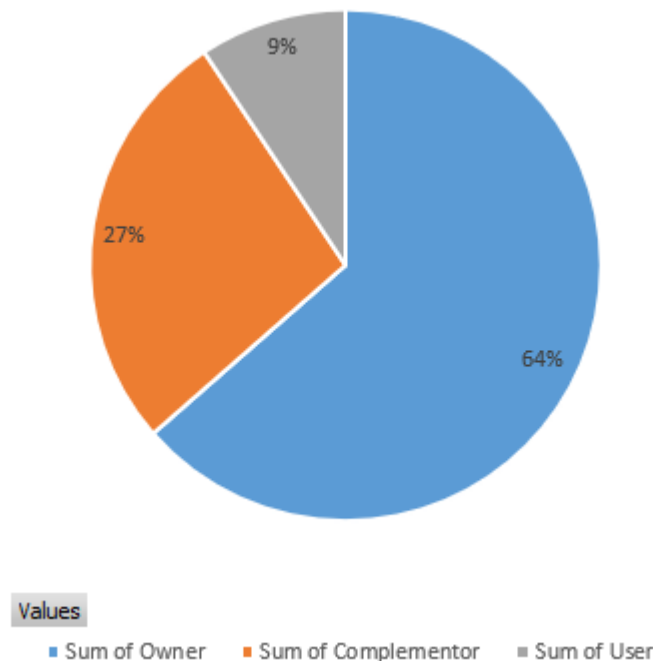


Figure 5: Overview of the proportion of different actor perspectives in the identified challenges.

2.4. Objective of the follow-up research

In the first phase of the research, an SLR was performed for designing a framework of PBE challenges. The main themes were identified in the shape of subcategories and categories.

The objective of the follow-up research is to answer the following sub-questions to the main research question and contribute to the outcome of this research:

Sub question 3: Are the classified challenges for PBEs relevant in practice?

Sub question 4: How can the proposed overview of challenges of PBE be refined with practical information?

This will be achieved by verifying the challenges and their sub-categories in an empirical setting.

3. Methodology

3.1. Conceptual design: select the research method(s)

The objective of this part of the research is to answer the following sub-questions to the main research question and contribute to the outcome of this research:

Sub question 3: Are the classified challenges for PBEs relevant in practice and why?

Sub question 4: How can the proposed overview of challenges of PBE be refined with practical information?

The information required to gain insight into a contemporary phenomenon such as the challenges of PBEs is qualitative information gained from various actor perspectives. Besides the validation of the overview, an attempt is made to understand the reasoning for assessing the relevance and possibly refining the framework. No control over the research setting or involved events was required to reach the research objective, as the purpose was to gain knowledge about PBE challenges in their real-life setting.

Regarding the research approach - Yin (2018) compares Experiment, Survey, Archival Analysis, History, and Case Study, concluding that only Case Study and Archival Analysis are applicable methods to research contemporary events and do not require control over behavioral events.

Archival and documentary research, while providing easier access to data such as community blogs, is not delivering enough context information for the refinement of the established overview and does not support the answering of “why” questions for understanding the reasoning in depth.

Archival research likely would show the complementor and user perspectives, while we are looking to include all ecosystem participants for a comprehensive result.

Finally, the case study method was selected for empirical validation of the previous findings, because it is considered a suitable approach when “an “in-depth” description of a social phenomenon” is required” (Yin, 2018, p. 33). The proposed overview would be evaluated in practice “through subsequent data collection” (Saunders, Lewis, & Thronhill, 2019, p. 153) and if possible, suggestions for its refinement would be given. This approach additionally provided the opportunity to explain the “how” or “why” a phenomenon functions, and therefore gain a detailed understanding of the researched phenomena.

A single case study method has been specifically selected due to several reasons: firstly, while a multiple case study provides for better replicability (Baxter & Jack, 2015), the time limit set for this project favours a single case study. The single case study method places findings in one context (Baxter & Jack, 2015) and helps gaining deeper contextual understanding (Dyer & Wilkins, 1991, p. 614), whereas the multiple case study concerns several contexts. The level of analysis in this research is the ecosystem, a single PBE case study enables us to include multiple perspectives within the same environment and can provide common understanding of the challenges. The familiarity of the researcher with the basic components of the case study PBE additionally helps saving time during interviews, that would otherwise be spent in description of the environment.

Common challenges with the case study method are the level of rigor, generalizability of the research (Yin, 2018), and access to the research setting (Saunders et al., 2019). These challenges were overcome by a methodical approach and planning of the design and execution and careful selection of the case. The result of the case is generalizable in a similar setting because the interviews have been planned with main actor’s characteristic to all PBEs and can be viewed as a representative sample.

The empirical setting for this research is a centralized PBE in a business-to-business environment. The platform owner executes pronounced control over the ecosystem, the complementors are operating within the range allowed by the platform, and user organizations are present.

3.2. Technical design: elaboration of the method

To validate the overview of PBE challenges, evaluate its relevance, and to possibly refine it from findings in practice, a case study was performed. The evaluation of the overview was performed at the business ecosystem level, which includes multiple stakeholder types.

Using the purposive sampling method (Saunders et al., 2019), the selection criteria for the case were: the case should be information-rich and provide sufficient data to answer the research question. The case concerns a PBE, where three main actor types are present: platform owner, complementor, and user (Hein et al., 2019; Tiwana, 2014). Sufficient access to data and relevant actors should be possible for research purposes, in the timeframe given for completion of the project.

To collect the required data for answering the research sub-questions, we expect to be able to interview with business/project managers, IT managers, and users of PBEs, who are involved in PBE applications and therewith related decisions in their environment, have sufficient work experience to ensure familiarity with the challenges and have a higher education, to ensure a certain level and ability for abstraction. The involvement in PBE applications and related decisions ensures the quality of collected data. For reasons of data triangulation, it was expected that a minimum of 2 of each actor types should be interviewed. This led to a requirement of a minimum of 6 semi-structured interviews, as there are three main actor types.

The semi-structured interview method was selected and is most suitable in cases, which require the understanding of reasoning and where probing might be required, to build on previous answers (Saunders et al., 2019). Semi-structured interviews allow bringing the discussion into areas, which were not considered before, but can offer valuable insight, as a result providing a detailed set of collected data.

To ensure the consistency of the collected data an interview protocol was required. Additionally, the interview protocol supports the interviewer in assessing the progress of the interview during it and ensures an inquiry-based conversation (Castillo-Montoya, 2016).

Three parts of the interview were thematically predetermined and executed in a specific order. The open question type and particular sequence was chosen to allow the interviewee to elaborate on challenges of (perceived) importance, which come to mind without sensitization to preliminary research findings.

At the beginning of each interview, an introduction to the project and its purpose was given, and the opportunity to ask clarifying questions. The first part of the interview consisted of open questions, to inquire what typical challenges are faced now or in any particular past moment of the PBE application/adoption process. The second part of the interview was used to validate the PBE challenge overview by inquiring if any of the listed challenges have been experienced and under what circumstances. Each interviewee was asked to give the reasoning for the relevance of a challenge in this PBE one by one- to ensure continuous interaction. The closing part consists of open questions, inquiring if any further challenges have been experienced by the interviewees, which were not covered by the overview and inquiring about the completeness, helpfulness, and usability of the list. Finally, an opportunity for questions or comments was provided. The interview protocol is available as Appendix 4: Interview protocol. Due to the COVID-19 pandemic, internet-mediated video-interviews were executed. Each interview was planned for two hours, to ensure coverage of all sub-categories.

To address the case where not the complete overview would be covered during 120min interview, the challenges were grouped according to the interviewee position (PBE owner, complementor, user) regarding the PBE and the actor perspectives registered during the preparation of the overview.

A pilot interview with “people who mirror the characteristics of the sample to be interviewed” (Castillo-Montoya, 2016, p. 827) was decided to be desirable to ensure the validity of the interview protocol and was executed before the launch of the empirical research.

3.3. Data analysis

To perform data analysis and organize the data, the recorded interviews were fully transcribed, followed by coding.

Each interview was saved as a separate anonymized text file, cleaned, and sent to the interviewee to confirm factual correctness.

Coding was performed on anonymized transcripts of the interviews according to the deductive content analysis method in combination with the inductive content analysis method (Elo & Kyngäs, 2008). To test the developed overview of challenges, it was used as a categorization matrix and the data was coded according to it. In parallel, aspects which did not fit the categorization frame were noted as new challenges. This approach was chosen, as it is known to be used for testing categories (Elo & Kyngäs, 2008), providing validation. The newfound challenges were addressed according to the method described in paragraph 2.1.2.

If new challenges were identified, these were organized in sub-categories and over-arching categories, based on similarity in meaning and thematic similarities. These were presented as proposals for verification in future research. If the data offered a greater detail to challenges in the framework, it was presented as refinement from the empirical setting.

Coding was supported by a data extraction table, available in Appendix 6: Interview data extraction table.

Further the frequency and the number of validated challenges is used to present quantitative data in this cases study. The content and contextual information offered by the interviewees is presented as qualitative data.

During coding, the data was classified as SLR – meaning that it overlaps in meaning with the overview of challenges created after SLR, Refinement – meaning that it refines an already identified challenge, and New – meaning that this is an addition to the overview that cannot be viewed as a variation or refinement of already identified challenges (Table 4).

Finally, results show the alignment between the PBE challenge overview and the findings from the empirical research, including refinements and new emerging challenges for further validation (Table 6: Comprehensive overview of PBE challenges).

3.4. Reflection w.r.t. validity, reliability, and ethical aspects

3.4.1. Validity

Construct validity is the “extent to which your measurement questions actually measure the presence of those constructs you intended them to measure” (Saunders et al., 2019, p. 799). To address this, a pilot interview was performed, and explanation of different concepts was offered in the interview protocol. After the interview to confirm the content and accuracy of the data, all participants received a transcript of the interview.

To ensure external validity, the interviews have been planned with main actor’s characteristic to all centralized B2B PBEs and can be viewed as a representative sample for a similar setting. Without further case studies it is not possible to claim, that the overview of challenges is applicable to all PBE environments. All interviewees have experience with several PBE’s, all but one – continuously from the same actor perspective. This experience provides all interviewees with deeper understanding of challenges characteristic to PBE’s.

To observe internal validity, the methods for SLR were adopted and followed, and the validation of the overview and its relevance has been done on basis of explicit interviewee responses. Anonymity through anonymization of the interview data provides the participants with space to give candid answers and removes bias flowing from identification in working environment.

For assuring participation in the empirical part of the research, a sponsor was assigned, who holds a position within the user organization and therefore can provide information about suitable

representatives of the user organization, the platform owner, and contributors. The interviewees were selected according to a set of criteria and by internal recommendation: initial interviewees were from the user organization, who were able to recommend further interviewees.

As the sample concerns only one representative PBE, there is a limit to the generalizability of the findings of the empirical research part. It can be generalized to a similar setting but may call for further validation in varying circumstances.

3.4.2. Reliability

The content analysis method used creates opportunities for introducing a bias for both reasons that the coding was performed by one researcher and by the fact that the results are conceived through interpretation. When using the inductive content analysis method, the researcher is creating categories through interpretation, which could introduce a variation in the preliminary results. This, however “applies to all qualitative methods of analysis” (Elo & Kyngäs, 2008, p. 114).

To address the reliability of the research and provide a visible link to the data, the following measures were taken: the employed methods have been described, including the description of specific application for this case, the literature sources, textual units of analysis, coding units, and from there flowing synthesis has been provided in a connected overview (Appendix 3: SLR Coding and data extraction, Appendix 7: Interview data extraction). In this way the categories are traceable back to the text units and open coding process.

In case of replication by fellow researchers - a variation in preliminary research result might also occur due to the fact, that included were literature sources with the publishing dates between 2010-31/10/2020. Further additions to the literature sources may expand the overview.

To address participant error and bias (Saunders et al., 2019, p. 214), the participants were able to choose suitable time for conducting the interview. The interview was executed through a video call, giving the participant ability to increase the privacy of their setting. Additionally, before the interview announcement was made, that the interview data will be anonymized and not traceable back to the interviewee.

3.4.3. Ethical aspects

To ensure ethical soundness of the research, interviewee consent, and validity of data, information was shared with the interviewees on how the collected data will be used and anonymization of the data before the interview. The verification of the collected data was achieved by sending the transcript to the interviewee for confirmation.

The setting of the research case is an international and multicultural high-tech manufacturing environment, the interviewees engage daily in cross-cultural business interactions, which ensures the absence of a cultural bias.

4. Results

4.1. Research implementation

Interviews were conducted according to plan, each of them was planned for 120 minutes, however only two of the interviewees could validate complete list of challenges (See Table 7: Instances of recorded challenges per respondent). To prevent revalidation of the same challenges, the order of the challenges presented to Users, Complementor and Platform owner was rearranged – according to the relevance by actor perspective perceived after initial SLR (Appendix 4: Interview protocol).

The initial plan was to interview at least two representatives of each actor type to address construct validity, however while responsiveness from User actor types was high –thanks to the sponsors activity (four participants), it was low from Complementor actor types (one participant) and Platform owner actor type (one participant). The overview of interviewees, their organizations and the roles within these organizations can be reviewed in Table 3: Interviewee roles.

Table 3: Interviewee roles

Legend	Organisation	Role
U1IT	User organization	IT architect
U2BU	User organization	Senior project manager
U3BU	User organization	Senior project manager
U4BU	User organization	Senior manager
C1S	Complementor	Sales director
P1DA	Platform owner	Enterprise architect

The validation of data collected in 6 interviews resulted in coded 114 instances of challenges (Table 4: Overview of number of challenges per category). The semi-structured interview allowed for rich context, as a result new challenges were identified during coding. The division between exact validation (SLR), refinement (Refinement) and new (NEW) challenges can be reviewed in Table 4. If the total amount of challenges is to be viewed per division by category, then the overview (Table 4) indicates the dominance of Specifics of business model category with 35 challenges, followed by Ecosystem Governance with 29 challenges, then by PBE Phenomena with sixteen challenges.

However, given that the division of interviewees is skewed towards dominance of actors, it is logical that Specifics of business model would dominate, as it contains the subcategory User Organizations.

To create a balanced dataset and eliminate the oversampling of user perspective, it was decided to create a weighted measure. Table 7 shows the coverage of all interviewees of the overview of challenges and indicated the instances of challenges recorded per respondent. 0 means – no such challenge has been experienced by respondent and therefore is not relevant in practice, and NA – the respondent did not validate the challenge due to time constraint. Table 8: Weighted data shows the assigned weight per actor perspective on each Sub-category, assigning equal weight to each actor type to compensate for the number of respondents. If one of the interviewees was not able to cover a subcategory due to time constraints, the weight was readjusted between the remaining participants per actor type. See example subcategory of Interoperability: Answers were collected from User and Complementor actors, but not from Platform owner. Three users responded and one complementor. For this reason, the weight assigned to User and Complementor actor responses was

0.166667 and 0.5 respectively. For the result the number of challenges was multiplied by the weight of each actor.

Each subcategory of challenges was validated by a minimum of two respondents (Table 7), the frequency of appearance of each challenge.

4.2. Research results

To answer the main research question, a set of sub-questions were developed.

Sub question 1: What are the challenges faced by PBEs in the literature? and 2: How can an overview be developed based on the challenges found in previous research and what would it look like?

In the literature study of this study 92 PBE challenges were identified (Appendix 3: SLR Coding and data extraction). As a result of data synthesis 27 groups of challenges were recognized. The full list of 27 challenge groups with descriptions can be found in Table 2: PBE challenge overview.

After this, six main categories of challenges were identified: architecture, competition, ecosystem governance, PBE innovation, PBE phenomena, Specifics of business model. The detailed list of challenges, sub-categories, and categories can be reviewed in Appendix 3: SLR Coding and data extraction.

Sub question 3: Are the classified challenges for PBEs relevant in practice?

To evaluate the proposed overview in practice, a case study was performed in a B2B setting of a centralized PBE environment. Challenges in all categories were verified through empirical research, and therefore relevant. The exception being the subcategory of collaborative consumption in the category of specifics of business model. The total count of identified challenges during empirical research is 114. 91 challenges were identified to be exactly overlapping with the challenges identified during the SLR part of this research or be a refinement of these. 23 challenges were identified to be new additions (Table 4).

Table 4: Overview of number of challenges per category

Status	NEW	Refinement	SLR	Total
Architecture	0	1	14	15
Competition	0	4	3	7
Ecosystem Governance	4	7	18	29
PBE Innovation	1	5	6	12
PBE Phenomena	2	7	7	16
Specifics of business model	16	2	17	35
Total	23	26	65	114

Overview of newfound challenging aspects can be found in Table 5.

Table 5: New identified challenging aspects

New identified challenging aspects	Nr. Of occurrences
Accommodation of different use cases within user organization	3
Adoption of new solutions	1
Appropriate control mechanisms within user org	2
Conflict of interest within user organization on how a solution should look	1
Growing complexity	1

Incorrect use of PBE functionality	2
Innovation adoption	1
Insufficient resources to comply with coordinated change	2
Insufficient resources to discover new solutions	1
Platform evolution as challenge in certain conditions	1
Safeguarding sensitive data	1
Solution dependant on a particular person	1
Unethical behaviour of user	1
User organization challenge to keep up with PBE growth	1
Using data stream to monitor users	1
Design Lead time	1
High demand for solutions	1
IT Infrastructure	1
Grand Total	23

The relevance of challenging aspects could be enhanced by contextual information from interviewees.

Within the category of Architecture:

Interoperability: Mentioned as one of the most prominent challenges by users and complementor. Synchronization and mapping of data fields between applications take a lot of time. In case different complementor applications do not interface in the right way, the user organization is required to build custom solutions or maintain a “human link” (U3BU) between applications. Both solutions require extra resources. For the complementor “it is a constant battle to ensure that we play and interoperate well with the entire solution stock products to make sure that our software runs” (C1S). In all cases this is perceived as a recurring challenge.

Customization: Challenges related to customization are dual faced: firstly, the way that PBE owner prescribes the use of the platform forces user organizations into doing customizations to improve ease of use, secondly, these customizations require resources to be invested in maintenance “every time there is a release of some sort of - a patch fix or whatever” (U2BU). “The robustness of this whole system is directly affected by the level of complexity” (U3BU), which is caused by the customizations – “You turn a knob here and there something falls over where there's no apparent connection, but still, it falls over” (U3BU). Also, customization challenges are recurring and continuously relevant.

Modularity and fragmentation: Operational challenges, where a 3rd party feature, such as a “same-site-cookie” gets blocked due to browser update, which disables a function and then “have to do the analysis what is causing it - that's one, and once you figure out what's causing it - you need to fix it” (U1IT). These challenges require a high time investment and knowledgeable personnel, which may not be available in user organizations always. This challenge may be neutralized by trying to limit the number of third-party solutions, which are being used.

Within the category of Competition:

Assimilation: Particularly relevant for contributor, as it poses a threat to their business. The complementor must be prepared for this challenge and have a variety of strategies and business plans prepare for assimilation by the platform provider. Another relevant aspect of this challenge is

“the threat of them acquiring a competitor and rolling that competitive product into their platform. It probably would be more hurtful, because theoretically that competitor’s product will already be very well rounded out and will be embedded eventually into the platform solution” (C1S).

Competitive thinking: The case study PBE being in mature state has made some challenges within the Competition category less prominent, as expected in an emerging PBE environment. An example of competitive thinking challenge however was given within the mature PBE owner environment between teams working on comparable solutions/functionalities.

Balancing competition and collaboration: relevant from the perspective of contributor, “the challenge we have as a smaller company is that the platform developer is by extension so big that they are dominant and so it's almost the approach of it's our way or the highway type of thinking” (C1S).

Dominance: continuous activity, to be perceived as the dominant platform. For complementor “It's proactive marketing. We have three groups that we sell to. It's a big challenge to stay on top of mind with each of those groups because there are hundreds or even thousands of add-ons or partners like us out there vying for the mind share of each of these groups” (C1S).

Category of Ecosystem Governance:

Control: The PBE implements membership-style control mechanisms for complementors, where the higher levels give the complementor prestige and other benefits – these mechanisms have a direct and substantial financial impact on the contributor. A positive effect of this control mechanism is an improved customer experience. “An example of control around technology would be, for instance, they introduced a new experience for mobile applications, for phones and tablets, and there was a certain technology that was adopted which then transcended down to the partner where they had to adopt this technology. So, it's another example of control - if you want to connect to our mobile application - this is the protocol, this is the types of software that you need to develop to provide an integration to our CRM system for the mobile experience” (C1S).

The degree of control on the PBE has been shifting towards the PBE owner in the last years due to technology evolution – cloud services. If in the past user organizations were maintaining their own on-premises instances of the PBE, currently most of them have made choices to move in the cloud. A direct result of this is the loss of control and in the case study – increased strain on the user organizations resources to be able to keep up with the evolution and updates of the PBE. “You're really at the mercy of [PBE owner] and she [IT] told us that the document that describes all the changes is so huge that they hardly have any time to absorb it, let alone understand what the implications will be for our set up” (U3BU).

Coordination: Particularly user organization recognizes this as a challenge and translates the need for high number of customizations as the direct result of the PBE owners’ manner of coordination, “so they try to coordinate, they send out information about this. It's that I don't think we have enough resources to really, with a fine comb, go through what that means for us” (U2BU).

Coordination is a challenge between various complementors, at the end- due to the magnitude of the PBE – the complementors also need to coordinate appropriately between each other.

Coordination with the PBE owner from complementor perspective is requiring resources. “That is something that is a challenge that we face annually. Relationship management with [PBE owner] is important and the reason why it's a challenge is that constant reorganizations are going on every year [..]. Because the organization is so big and there are many important managers in product

management in software development and sales and marketing, it's important, it's critical for the partner to be able to manage those relationships with all levels of the organization, if you to provide a good experience to customers and be thought of by [PBE owner] as an important partner" (C1S). To connect seamlessly with the PBE interfaces, again proactive coordination with the PBE owner is required to make sure that matching solution is developed on time on the complementor side. Besides that, coordination is required when supporting different PBE instances and user interfaces.

From PBE owner perspective the most effort on coordination is spent when integrating various acquired solutions into the existing and modular ecosystem. Not only because of the time and design effort spent on the integration, but also the aspect of absorbing organizational structures, which differ in culture and size from the PBE owners own.

Data Management: A concern, as due to many users in user organization, it is increasingly difficult to control for what purpose the data can be used, which can result in GDPR breaches. It is challenging within user organizations to ensure that sensitive data is not being "leaked", when some users are terminated – this risk becoming higher when working with agents, who are multi-homing.

Ecosystem relations: validated from the PBE owner perspective, particularly in case of acquisitions, when acquired employees are uncertain about their future, what their role would be or whether their solution will continue to exist. "I think change management and again building up trust and being very transparent in why you are doing things. And when you are doing things, I think that is important" (P1DA).

Effectiveness of governance: The structure of how support organization of the PBE is put together, can be challenging. An example was given, where part of the support structure consists of external contractors, who are not interested in providing efficient solutions – this impacts the user experience in a negative way. From PBE owner perspective, it is relevant to prioritize platform stability over some requests for feature or improvements from customers. "And the users, they do not understand it. For them it is something very important. For Microsoft it is more important that the platform is stable" (P1DA).

Ethical challenges: Data streams being used to monitor user activities, creating negative feelings and "Big Brother" associations. Some users may use the data in an unintended way, which brings personal gain to them, they create disbalance in what they way of working with the data in the PBE in the user organization was intended to be. The PBE owner may take ethically questionable choices when it comes to continuation or appropriate handling of acquired businesses/functions.

Finance: the aspect of complementor being able to prove to the PBE owner its financial viability.

Regulatory: particularly relevant from the PBE owner and complementor perspective, as any regulatory issue poses a threat to business revenue. Also from user organization perspective, it is a challenge to deal with regulatory issues, data privacy in an international business environment. The PBE owner needs to invest resources to be able to prove, that they are complying with the requirements, for example – by using independent auditors. The effect of such challenges is mainly delay of release of new solutions.

Category of PBE Innovation:

Innovation acceptance: relevant from all three actor perspectives. "The challenge that we're having is getting customers to adopt it because it is difficult to implement. The customer needs some high-quality image assets to be able to adopt this technology. There's a cost associated with it from a licensing perspective, but also there's training and so there are challenges that we must get our

customers to accept this innovation” (C1S). “It’s a common problem, and for platform it’s the same, but if you really want to get the benefits out of a platform you also need to know how the different components in the platform interact together, because otherwise you’re just using a component. And yeah, the actual benefit of the platform is then hardly seen” (P1DA). If users do not accept the innovative solution within user organization, this can have impact on business outcomes, if customers do not accept the innovation of the complementor – they do not see any return on investment.

PBE/product innovation: perception of complementor has negatively been affected by the perception of the PBEs solution quality as low. Complementor continuously is occupied with projecting their value proposition to the PBE owner and to end-users: “That’s something we face every day. Staying relevant, conveying to the market that we’re leaders, that we’re product innovators, and ensuring that positive perception is out there in the ecosystem” (C1S). The PBE owner continuously needs to think about innovation and find new mechanisms to create more value and new solutions: “[the challenge is] really to be one of the first to identify the new opportunities. Huge investment in research. But also trying to think out of the box of what might become something soon” (P1DA).

Category of PBE Phenomena:

Evolution: Evolution of the PBE may force more customizations on the user community, leading to further challenges or may be at faster pace than user organization can adapt to and consume resources (time). Some new functionalities of the PBE can clash with customizations of the user organization instance. For the complementor it is “important [...] to get pre-released versions of the references to do the testing, to ensure that we are compatible with the next release. [The PBE owner] has a very aggressive release cadence so if the partner does not stay in lockstep with them and they introduce a new release of the PBE component, and it does break partners integration, then the customer is in pain. And then they must wait for the partner to update, so that’s just a constant challenge that we all have in that space - to ensure that we’re in lockstep with [the PBE owners] releases” (C1S). The PBE owner by providing their technical roadmap to complementors, enables the complementors to react in time and to increase value of their own solution through evolution together with the PBE.

Legitimacy: complementor is experiencing challenges with establishing of cognitive legitimacy in new markets. “There’s more demand for companies that provide it’s called field service activities, so there are organizations that don’t produce any tangible products but provide a service. Like repairing elevators, for instance. All they do is provide services for preventive maintenance, break-fix, contracts for elevators. It’s not a new industry, but it’s an industry that is starting to adopt technology to streamline its processes for quoting those contracts and pricing those contracts. To be legitimate and succeed in that new industry vertical we need to understand the requirements and the demands so that we could offer solutions to solve the issues in that new emerging market” (C1S).

Platform dynamics: due to more open and modular design of the case PBE, it’s shift from one monolithic application into a loosely coupled collection of components to the underlying platform – platform openness as a challenge is less prominent.

Platform properties: from complementor perspective, the PBE is in some modules not near the leading position and therefore not delivering the full potential of positive network effects.

Platform/functionality start-up phenomena: relevant for emerging PBEs, long term complementor had experienced all start-up phenomena challenges at the time. From PBE owner perspective, these challenges are not experienced by functionalities, not by the PBE itself.

Category of Specifics of Business Model:

Local challenges: Relevant as these present challenges in global organizations to provide consistent experience across all user geographies. In cases of inadequate or hostile (China mentioned as example) infrastructure, the user cannot use full potential of the PBE, or it requires them to spend a lot of resources (time) to get their work done. Language barriers can have negative effect on PBE and functionality adoption rate, user training efficiency. From complementors perspective, some geographies are not attractive markets due to low level of disposable income and low number of investments in technology.

User organizations: Technology use inertia is continuously relevant in the context of change management deployment, users resisting or being uncomfortable with the change implemented in the platform. This may be countered by limiting the size of each deployment and “fix those items quickly rather than saving them all up to do another big deployment, which is very hard for people to digest” (U2BU).

Platform management within organization is mentioned as one of most prominent challenges, especially the aspect of training the users in the proper way of using the platform in face of its growing complexity, because “if people can't use the system we put in place, then what's the point?” (U2BU). Relevant also in the aspect that the PBE structure does not fit all use cases within the user organizations, where the user organization structures then must adjust to the structures supported by the PBE – and this hampers the efficient use of the PBE in certain user groups. A variation of this challenge is where different user groups want the same solution to have contradictory functions, this is a strain on the user organizations resources and creates delay in implementation – “I've escalated the fact that I can't satisfy both sales and factory and something needs to happen. That can take weeks before there's a final decision. They can be very impactful” (U3BU). A challenge is also the change of data analytics approach within the user organization, which makes it difficult to maintain order- if the relevant fields or how data is collected keeps changing.

In the way how the PBE is managed technically: it is important to scale the level of management to the purpose. An example was described, where with strong focus on security, too many complex requirements were presented to a small company trying to register an app.

Within the user organization a challenge is setting priorities, selecting the correct options to develop, “in what kind of things will we put our hours and money. That is a big challenge: you want to do everything, you want to do more, but that's not possible” (U4BU). This can have far reaching consequences on how the PBE is behaving or used in the organization in the future – “you can only find out after a while the effect of your choices” (U3BU). As an example, in this case study has been mentioned the move from an on-premises PBE version to a cloud version (U3BU). This choice resulted in loss of control over the update schedule of the PBE: “And what they are doing is periodically and regularly make changes to the cloud version. They have a major upgrade twice a year. They come with documents that support what they're going to do, but because our instance is so heavily customized, we have the danger that they will flick a switch somewhere which will have an effect, not here in the program, but somewhere else in the program” (U3BU). This is asking for more resources on the user organization side to maintain functionality of their PBE instance.

It is also important to keep in mind the purpose of the PBE in user organization, that the PBE is a tool and all the functionalities that can be added should contribute to the efficiency of the users. “If the balance is that they claim that they are more working on [the PBE] than meeting with customers, then everything is getting out of control, so that is an ongoing challenge” (U4BU).

A new identified challenging aspect has been the design lead time: when non-technical users request solutions and the alignment with the IT support is not efficient. This requires a high time investment from IT side and re-works of the solutions.

Also, IT Infrastructure may pose a challenge: where PBE owner discovers missing critical components in the user organizations IT infrastructure, so that it hampers the performance of the PBE.

Figure 6 shows the weighted distribution of challenges considering actor types. The results of empiric validation confirm the initial proportion of distribution of challenges (Figure 3), top two challenges in descending order being Ecosystem Governance and Specifics of business model.

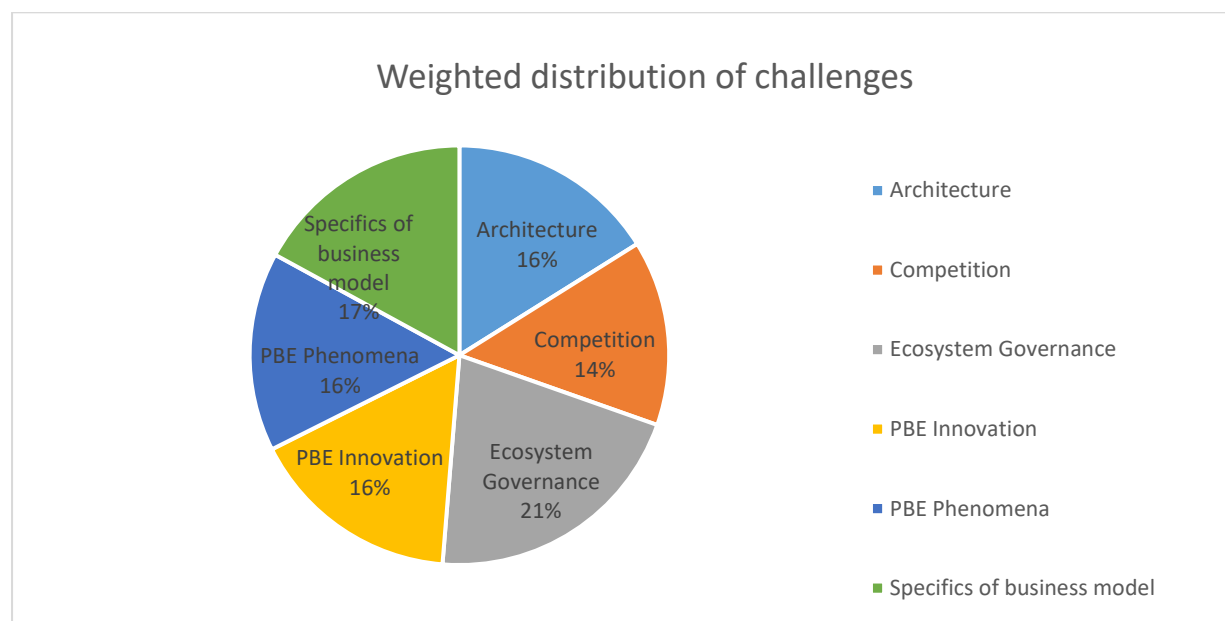


Figure 6: Weighted distribution of challenges

Sub question 4: How can the proposed overview of challenges of PBE be refined with practical information?

The PBE challenge overview (Table 2) was reviewed against the responses of interviewees and refined with responses providing a better understanding of the challenge.

A colour scheme has been applied to the final overview visible in Table 6: Comprehensive overview of PBE challenges, to easily show the status of the challenges against the theoretical research. The colour scheme is explained in the legend below.

Text – challenge was not validated during case study

Text - marked in green are the validated challenges

Text - marked in purple – the added refinement

Text - In red are the perceived new challenges

In the final overview of PBE challenges, partial validation was achieved in the subcategories of competitive thinking (competition), where competitive challenges during formation of PBE were not perceived; balancing competition and collaboration (competition), no resistance caused by dominance of one of the actors could be registered (competition), challenge to become a dominant platform (competition).

The column Proposed solutions offers a potential solution to a challenge, where respondents were able to provide one.

Table 6: Comprehensive overview of PBE challenges

Category	Subcategory	Description	Proposed solutions
Architecture	Interoperability	Interoperability issues related to various technologies and vendor applications, not only between the platform and the application, but also on inter-application level.	Complementor: gain access to platform roadmap and make sure complementor product is ready.
	Customization	Customization issues, such as software development on top of the platform, with positive (e.g., increased ease of use for a specific purpose) and negative (future migration/technology update complications) consequences.	Negative consequences: if PBE brings out a solution that was managed by customization until then, the solution is to undo the customization and step over to the released functionality. Stop customizations until the instability has been addressed. Have a good management tool for management of changes. Complementor: release all customizations into standard product to avoid maintenance of several versions.
	Modularity and fragmentation	Standardized interfaces enable 3rd parties in autonomous innovation, carrying the risks of unpredictable modular evolution, fragmentation, and high variance. This can endanger the user experience and overall system integrity.	Countering issues with system integrity: finding of root cause and doing an assessment of issue, to ensure no repeatability in future. Limit number of 3rd parties connected to the complementor product.
Competition	Competitive thinking	Competitive thinking as a challenge during the formation of PBE and resistance from other ecosystem members against the development of co-specialized assets. Competitive thinking within different teams of PBE developing similar solutions.	
	Assimilation	Challenge of assimilation of application into the core platform if the value propositions of each are too similar or if the application has a very attractive value proposition. Threat to complementor, that PBE may acquire and roll out a competitor's solution.	Challenge of assimilation of application into the core platform: have a niche product which is not attractive for Platform owner to develop, have a robust solution with high value proposition so that platform owner cannot develop quickly better solution, be prepared for potential acquisition. Threat to complementor, that PBE may acquire and roll out a competitor's solution: position own solution as candidate for acquisition.
	Balancing competition and collaboration	Challenge to balance competitive and collaborative behaviors between the platform owner and complementor, resistance caused by misalignment or too strongly (perceived) dominance by one of the actors.	
	Dominance	Challenge to become a dominant platform or complementary solution provider.	Utilize customer success stories to communicate dominance (complementor).

Ecosystem Governance	Control	Challenges related to exercising of control, the degree of control on the PBE and the effectiveness of the control, creation of conscious control mechanisms, and involvement of all actors in this creation. Development of appropriate control mechanisms within user organizations.	Effectiveness of control: to participate in some ecosystems a membership is required - accept this as cost of business and increase prices or absorb this cost.
	Coordination	The challenges related to coordination, are the fact that it requires high effort such as internal and external relationship management , the creation of interfaces with different versions of the platform, contract design, creation of a common vision and strategy. A challenge is also adequate management of relationships between PBE actors, timely and adequate communication to actors about platform changes , coordination of acquired solutions.	Timely and adequate communication to actors about platform changes: have a dedicated resource on platform owner side to support user organization. Adequate management of relationships between PBE actors: complementor needs to dedicate resources to manage the relationship with platform owner. Internal relationship management: creation of joint teams in cases of acquisitions and assimilations. Engage key customers to decide on priorities and investments.
	Data Management	Challenges, related to Data Governance and Management are loss of confidential information, data ownership and the rights to use it, and information asymmetry (mainly between the platform owner and the complementor).	Rights to use data: in user organization this challenge occurs due to insufficient resources to properly implement solutions.
	Ecosystem relations	Uncertainty about the functionality of the innovations, personal safety, and privacy. Uncertainties regarding the performance of actors. Lack of and building of trust and transparency. Actors' dependence on the PBE for income or preference to remain independent. Insufficient understanding of actor collaboration mechanisms.	Uncertainties regarding the performance of actors. Lack of and building of trust and transparency (related to acquisitions): utilize change management best practices
	Effectiveness of governance	Realization of effective platform governance	Realization of effective platform governance: for user organizations - have an organization dedicated personnel on platform owner site, to ensure proper responsiveness. For platform owner: add resources for support, while financially justifiable. Engage key customers to decide on priorities and investments.
	Ethical challenges	Actors (in collaborative consumption) might question the morality of the PBE practices (e.g., lower wages, more time pressure, less job security, asocial working hours), or the PBE and its services might conflict with an actor's previous	

		experience, social values, and usage patterns. Data stream usage to monitor actor activities for productivity. Unethical behavior of users.	
	Finance	Challenges related to reaching of financial viability and demonstrate financial security.	Demonstrate financial security for complementors: be careful and transparent to platform owner.
	Regulatory	Issues related to piracy, data privacy and protection , physical safety, surge pricing, and tariff issues. Regulatory issues also manifest with regards to better work norms and working conditions. In some cases, market dominance might prove to be a legal liability for PBEs.	Only solution is to accept regulatory limits and adhere to these.
PBE Innovation	Innovation acceptance and adoption	Innovation acceptance related challenges not only refer to the perceived difficulty associated with the understanding and usage of the innovation but also with its accessibility and the organization of the transaction, the adoption of innovation. Challenge to create innovation that is still acceptable to users, despite technological possibilities. These are also challenges to assign the right resources and time in support of education on platform functionalities.	Solution for training of users on PBE functionality: AI for improved user guidance when executing tasks. Innovation acceptance: improved onboarding and training of users, improved sponsorship from leadership. Innovation adoption: have a customer success department, which makes sure that the users adopt new complementor innovation. Innovation acceptance challenge to complementors: make sure target market understands value of functionality and value proposition. Platform owner: create personas, identify use cases that go with it and make these actionable in the platform. Engage with key users and have them use the new functionality to use, improve it and utilize them as ambassadors.
	Innovation roadblock	Challenges related to blocked innovation due to the high amount of different application and complementor connections.	When design work of applications on PBE side stops innovation on user org side: communicate upcoming changes in a structural manner, have dedicated personnel on platform owner side to support particular user organization.
	PBE/product innovation	Challenges related to the innovation of the core platform/ complementary product , its value proposition, addition of novel extensions. This includes also challenges related to the perception of the PBEs/ complementors innovation state and capabilities, such as its network size, customer support or solution quality.	Investment in research, creation of startups within platform organizational structure, which focus on innovation and new projects. Acquisition of innovative solution and technology providers. Customer support and solution quality: have dedicated personnel on platform owner side to support user organization.

PBE Phenomena	Evolution	Challenges related to the ability of the complementors and user organizations to adjust and coexist with the evolution of the core platform, the alignment of their goals. Challenges related to the platform owner's ability to adjust to the evolution of the ecosystem, the need to stimulate evolution. Evolution of platform may force more customizations on the user community, leading to further challenges.	When PBE evolution results in more customizations for user organizations: make conscious choice of only using out-of-the-box solutions. Errors in PBE because of evolution (due to customizations): stop customizations and develop toolset for better control. User org keeping up with evolution: have dedicated personnel on platform owner side, to support specific needs of user organization. Challenges related to the ability of the complementors to adjust and coexist with the evolution of the core platform: secure ability to test PBE new features before release (mostly through elevated membership program owned by platform owner). If that is not possible - heavily invest in relationship management with platform owner key employees to gain visibility on their roadmap and stay informed in such way. If the platform is evolving and making your product obsolete, then you need to work with other host platforms to develop integrations. Focus on proactivity to stay in tune with platform changes.
	Legitimacy	Challenges related to the PBEs or complementors cognitive legitimacy, socio-political legitimacy, or the lack thereof.	Complementors cognitive legitimacy: receive input from stakeholders about issues which need to be resolved
	Platform dynamics	Challenges related to the lock-in phenomenon, and platform openness, such as for complementors complying with all PBE required certifications.	Enforce message of support to users who may want to leave the platform to counteract negative effect of lock-in phenomenon.
	Platform properties	Challenges related to network effects (positive or negative) and multi-homing.	
	Platform/ functionality start-up phenomena	Challenges related to the "chicken and egg" problem, lack of adoption, and problems of assembly of initial membership. Further challenges are related to the need for awareness of the PBE and various collaborations and finding adequate partners for it.	
Specifics of business model	Collaborative Consumption	Challenges related specifically to the collaborative consumption business model, such as the refusal of actors to participate, the contamination barrier, the image barrier, and the responsibility barrier. Additionally, also challenges related	

	to conflicts of interest created by offering services/products already offered by the (local) government.	
Local challenges	Challenges related to a specific local situation: low technology penetration level, inadequate or hostile infrastructure, low level of disposable income. Language barrier.	Inadequate infrastructure: no solution, invest resources to solve issue. Low technology penetration and disposable income: reduce prices (complementor)
Market dynamics	Challenges related to the high dynamism and unpredictability of the market of the PBE.	
User organizations	Challenges related to the PBE application in User Organizations: technology use inertia, incorrect use of PBE functionality, platform management in the organization (shifts of control), and the challenge to develop the correct options. Accommodation of different use cases within user organization. Resource scarcity: to discover new solutions, accommodate high demand for new solutions, comply with coordinated change, keep up with PBE growth, solutions may depend on a single person. Conflicts of interest on solution deployment. Too much complexity in PBE environment, which counteracts the primary value proposition. Safeguarding sensitive data. Long design lead times. Availability of sufficient infrastructure to support PBE.	Technology use inertia: division of to-be implemented changes in more digestible chunks for the user, communication of the change to the users. Platform management in the organization when management changes their data analysis priorities - resources to execute the changes, build a flexible system which allows this shift. Platform management in the organization - continuous request of customizations from business units: stop customizations to reduce negative effects on the rest of the users. Complexity of PBE environment: collect user inputs and prevent IT organization from being isolated from users, implement change management. Development of correct options: compose decision making teams consisting of leadership and users, present visualized and report of pending request, new technology - already preselected and prioritized. Accommodation of different use cases within user organization: utilize role profiling technique, create personas to understand what each use case really requires. Long design lead times, high demand for new solutions: Get a subject matter expert who knows the system but also knows the business, to support with projects and can mediate between both sides. Availability of sufficient infrastructure to support PBE within user organization: receive advice upfront from PBE on infrastructure requirements.

5. Discussion, conclusions and recommendations

5.1. Discussion – reflection

5.1.1. Reflection on the results

In accordance with studies exploring the PBE phenomena and the studies included in SLR, the empirical validation confirmed that the most prominent topic for challenges is ecosystem governance. All aspects of the architecture category challenges have been validated, this corresponds with the concept of Tiwana (2014), that architecture and governance are one of four core concepts when speaking of digital ecosystems.

Adding on to the initial overview created after the literature review of this study, the final overview contains more detail and refinement from practice. Where possible, potential solutions for challenges were proposed.

The empirical research results validate all challenge categories and most of subcategories, no new additions were made that would require a restructuring of the overview.

Underrepresentation within subcategories such as collaborative consumption (specifics of business model) and other collaborative consumption related aspects (within Ecosystem relations, Ethical challenges), suggest that the PBE faces a different set of challenges depending on the type of PBE (collaborative consumption, B2C, B2B etc.).

Underrepresentation of PBE maturity related aspects of challenges such as the lack of socio-political legitimacy (legitimacy), multi-homing within platform properties (Platform properties), struggle to reach financial viability (finance) and competitive thinking during formation of PBE (competitive thinking) suggest that also the maturity level of the PBE plays a role in the set of relevant challenges.

Control mechanisms: it was perceived from user that the most effective control mechanism of the PBE has been the shift of in-house instances of infrastructure. While users could have maintained a higher degree of control over their instance of the PBE while it was an on-premises version, the current dominance of cloud-based services leaves users' dependant on the PBE owners' cadence of evolution and updates.

During validation of challenges and solutions for Complementors for PBE Phenomena, Evolution – the solution for the challenge of the PBE evolving and making a complementors product “somewhat obsolete”, the proposed solution was to work on interfaces with other PBEs. In this case study multi-homing may not prove to be a challenge with this behaviour of users, but of complementors. None of the users effectively considered multi-homing as solution to locked-in challenges or validated that these are relevant. Herewith the statement of Tiwana (2014, p. 36) can be confirmed that for complementors multi-homing is a common strategy to avoid impact of a particular PBE failing and therefore is important for survival. However, for users the decision to multi-home will depend on the cost of multi-PBE affiliation maintenance.

During the validation of the prepared overview of challenges, new challenging aspects could emerge, through rich context provided in the semi-structured interview. The list of new identified challenges – a total of 23 instances - can be reviewed in Table 5: New identified challenging aspects. Most numerous new challenges were identified in in User Organizations, which indicates the gap of related research previously, if compared with the general number of challenges perceived by actor types in Figure 4. One of emerging themes is availability and constraints of resources in user organization to accommodate the requirements needed for PBE management, maintenance, and development of new options.

Additionally, to the validation and contextualizing of PBE challenges, the interviewees were asked to propose solutions. A total of 51 solution proposals were collected, of these eleven belong to User organizations, six to Innovation acceptance and adoption, six to Evolution, four to Customization.

Solution proposals for User organization challenge subcategory addresses challenges already validated in the overview, such as technology use inertia, development of correct options and platform management within the user organization, but also several newly found challenging aspects; accommodation of different use cases, growing complexity of PBE environment, long design lead times, high demand for new solutions and sufficient infrastructure availability. These solution proposals are presented together with the final overview of PBE challenges in Table 6: Comprehensive overview of PBE challenges.

5.1.2. Reflection on the research setup

The limitation of this study is the underrepresentation of two of the three identified actor types: complementor and platform owner. For statistical results this was compensated with weighting of the responses, however for the refinement of the challenges and finding of new challenges – the user perspective brought the most contribution.

In relation to external validity, the results of this research can be generalizable to other mature B2B centralized PBE environments. To test its wider applicability, further studies would be required.

In this research case no challenges related to collaborative consumption have been registered, as this business model is not applicable to this study case. Ecosystem relations, ethical challenges also are partly recognized, as they are tied to collaborative consumption business model.

Competitive thinking, dominance, finance, legitimacy challenges were identified in a smaller amount, as these are tied to challenges experienced by starting PBEs.

Most new challenges were identified in the Specifics of business model category, which contains User Organizations as sub-category and is represented by the highest number of respondents.

Due to this particular business case, some specific business models could not be verified, additionally the Complementor and Platform Owner perspective should be represented by at least one more interviewee.

Another limitation is that coding during the SLR and the empirical research part was performed by a single person, but the documentation of each step offers path for reliability testing by peers.

5.2. Conclusions

During the exploratory phase of the research topic, it was concluded that no comprehensive overview or study on challenges faced in digital platforms exist (Müller, 2019).

With this study an overview was created of challenges experienced by different actors participating in PBE environment (Table 2: PBE challenge overview). The comprehensiveness of the overview is provided by a wide scope of scientific literature used in the SLR. First challenges described in scientific literature were collected, organized, and synthesized, this overview then was tested empirically in a case study.

The final overview consists of challenging aspects of PBE environments organized into 27 subcategories and 6 overarching categories – Table 6: Comprehensive overview of PBE challenges. All identified challenge subcategories could be validated, except collaborative consumption, which was out of scope for this case study, it consisted of a centralized mature B2B PBE environment.

This leads to the conclusion that the created overview of PBE challenges is relevant.

The created Comprehensive overview of PBE challenges (Table 6) has been enriched from the empirical research part with refinement of challenging aspects, new challenging aspects and proposed solutions. The result is a tool, which can be used in practice to inform actors on challenges characteristic to PBE environments and offer practitioners perspective on potential solutions.

However, not all identified challenges are relevant for a mature PBE environment. As an example: in category Dominance, the challenge to become the dominant platform could not be validated, in category Competition - the challenge of competitive thinking during formation of the PBE. This leads to the conclusion, that a distinction between challenges may be established for PBE startup phase and for PBE maturity phase. This also presents a limitation of scope for this study.

Also, challenges registered under Specifics of business model, subcategory User organizations proved to be insufficiently addressed in literature and may require further in-depth study.

5.3. Recommendations for practice

The overview of challenges, with inclusion of new challenging aspects and proposed solutions can be used by different actors already present and considering entering the PBE environment. The overview of challenges can help inform as to what type of challenges are typically occurring in PBE environment and consider either proposed solutions or give opportunity to work on a different type of problem solution path. It also can support existing practitioners in finding a solution proposal by their peers, which increases practical value.

The following observations may support PBE actors in practice.

Observations mainly affecting user organizations: PBE deployment requires IT and project management resources, particularly in case of a complex PBE. In the effort to conserve resources, out-of-the-box solutions and features should be utilized, avoiding customizations and the maintenance thereof. Adequate IT infrastructure is required. To sustain a higher degree of control over the user organizations instance, it is recommended not to give up on-premises version, as the cloud alternative shifts the control balance towards the PBE owner. In case of a global organization, challenges regarding data privacy and challenges regarding varying quality of infrastructure can be expected. To avoid change of course in PBE management, a defined future state of the PBE or a clear management strategy should be available.

For complementors relevant observations: In order to provide a seamless experience for the end-user, it is recommended to invest in relationship management with the PBE owner – this ensures the sharing of technical roadmaps and gives the opportunity to evolve in lockstep with the PBE. To insure against assimilation threats, the complementor needs to invest in innovation and ensure that they provide a mature solution. Alternatively, interfaces with other PBEs should be developed, to secure against failure on one particular PBE.

For platform owner relevant observations: In case of wish for increased dominance, cloud-based instances versus on-premises instances seem to be beneficial. For complex environments, consideration is required as to the resources of customers during updates, innovative releases etc., as these have a high impact on user organizations with resource constraint. A possibility of a dedicated software engineer/case officer was offered as potential solution.

The overview can be utilized as a tool for scholars to be able to date emerging of new challenges, as the SLR contains all relevant PBE challenge addressing publications between the years of 2010 and 2020.

5.4. Recommendations for further research

The challenges that were identified as new during the empirical research part should be further validated for full inclusion in the overview of PBE challenges.

Further research may be focused more on challenges from user perspective, as research found so far has mainly focused on challenges experienced by the PBE owner and complementor actor types (Figure 7: Overview of subcategories of challenges per actor perspective). This is substantiated by the fact that the most challenges classified as new were found to belong to the User organization subcategory. This supports the view that also users should be scoped into future research on PBE phenomena, as opposed to the dominance of other perspectives in current research (Figure 4).

Another interesting research avenue may be division of PBE challenges per PBE type by business model B2B, B2C, Collaborative consumption or by ownership archetype – centralized, consortia based or decentralized (Hein et al., 2019). This has been recognized as a further gap in existing research (M. de Reuver et al., 2018). Cross-referencing the Overview of PBE challenges with a PBE model and actor perspectives may result in a more comprehensive framework for PBE challenges. Validation of the overview of PBE challenges in other than centralized PBE will lead to deeper understanding of the different challenging phenomena each actor in the PBE environment experiences.

Further it was clear from the research results, that some of the challenging aspects are irrelevant in this case study due to the mature state of the PBE. This suggests that there is merit in conducting further research exploring challenges in emerging PBE environment, to complete and enhance the overview of PBE challenges.

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Appendix 1: SLR articles

Full list of articles, including 1st and 2nd focus check and reason for exclusion.

Nr.	Reference	Included	Reason	2nd check	Reason
1	(2011). "The Beasleys speak to T-Mobile employees." Human Resource Management International Digest 19(5): 18-20.	No	Focus not on PBE		
2	(2020). "Mechanisms of Action of a Web-Based Intervention With Health Professional Support to Increase Adherence to Nebulizer Treatments in Adults With Cystic Fibrosis: Qualitative Interview Study." Journal of medical Internet research 22(10): e16782-e16782.	No	Focus not on PBE		
3	(2020). "Teen Psychological, Social, and Emotional Wellbeing: Moving Upstream with Evidence-Informed Policies." Health services research 55(S1): 26-27.	No	Focus not on PBE		
4	Abdul Majid, N. W. and S. Fuada (2020). "E-Learning for Society: A Great Potential to Implement Education for All (EFA) Movement in Indonesia." International journal of interactive mobile technologies 14(2): 250.	No	Focus not on PBE		
5	Adelson, P. and M. Eckert (2020). "Skin cancer in regional, rural and remote Australia; opportunities for service improvement through technological advances and interdisciplinary care." Australian journal of advanced nursing 37(2): 25-30.	No	Focus not on PBE		
6	Aguaded, J. I. and L. M. Romero-Rodríguez (2015). "Mediamorphosis and misinformation in the infosphere: media, digital and information literacy face of changes in information consumption habits." Education in the knowledge society 16(1): 44-57.	No	Focus not on PBE		
7	Agyekumhene, C., et al. (2018). "Digital platforms for smallholder credit access: The mediation of trust for cooperation in maize value chain financing." NJAS - Wageningen journal of life sciences 86-87: 77-88.	No	Focus not on PBE		
8	Ahmed, S., et al. (2020). "Moving towards online rheumatology education in the era of COVID-19." Clinical rheumatology 39(11): 3215-3222.	No	Focus not on PBE		
9	Aiello, M., et al. (2019). "The Challenges of Diagnostic Imaging in the Era of Big Data." Journal of clinical medicine 8(3): 316.	No	Focus not on PBE		
10	Alexopoulos, A. R., et al. (2020). "The Use of Digital Applications and COVID-19." Community mental health journal 56(7): 1202-1203.	No	Focus not on PBE		

11	Ali, A., et al. (2019). "TRANSFORMING PUBLIC LIBRARIES INTO DIGITAL KNOWLEDGE DISSEMINATION CENTRE IN SUPPORTING LIFELONG BLENDED LEARNING PROGRAMMES FOR RURAL YOUTHS." Acta informatica Malaysia 3(1): 16-20.	No	Focus not on PBE		
12	Alice, B., et al. (2016). "Digital Behaviour Change Interventions for Osteoarthritis - A Systematic Literature Review." Frontiers in public health 4.	No	Focus not on PBE		
13	Almasri, N., et al. (2019). "A digital platform for supervised self-directed learning in emergencies: the case of the Syrian crisis." Technology, pedagogy and education 28(1): 91-113.	No	Focus not on PBE		
14	Alyavina, E., et al. (2020). "Mobility as a service and sustainable travel behaviour: A thematic analysis study." Transportation research. Part F, Traffic psychology and behaviour 73: 362-381.	No	Focus not on PBE		
15	Amy, H., et al. (2016). "Designing the future of talking therapy: Using digital health to improve outcomes in psychosis." Frontiers in public health 4.	No	Focus not on PBE		
16	Anderberg, P., et al. (2019). "The Effects of the Digital Platform Support Monitoring and Reminder Technology for Mild Dementia (SMART4MD) for People With Mild Cognitive Impairment and Their Informal Carers: Protocol for a Pilot Randomized Controlled Trial." JMIR research protocols 8(6): e13711-e13711.	No	Focus not on PBE		
17	Andrews, J. A., et al. (2019). "Older Adults' Perspectives on Using Digital Technology to Maintain Good Mental Health: Interactive Group Study." Journal of medical Internet research 21(2): e11694-e11694.	No	Focus not on PBE		
18	Arts, K., et al. (2020). "On the merits and pitfalls of introducing a digital platform to aid conservation management: Volunteer data submission and the mediating role of volunteer coordinators." Journal of environmental management 265: 110497-110497.	No	Focus not on PBE		
19	Atallah, E. L., et al. (2019). "Social Media Network Utility in Disease Education: Experience from a CML-Disease Awareness Medical Education Program." Blood 134(Supplement_1): 5842-5842.	No	Focus not on PBE		
20	Bachy, S. and M. Lebrun (2015). "An Online Training Course to Learn How to Teach Online Former en ligne pour apprendre à former en ligne." Canadian journal of learning and technology 41(4).	No	Focus not on PBE		
21	Bachy, S. and M. Lebrun (2015). "An Online Training Course to Learn How to Teach Online. Former en ligne pour apprendre former en ligne." Canadian journal of learning and technology 41(3): 1.	No	Duplicate		
22	Bahagon, Y. and O. Jacobson (2012). "e-Health, m-Health and healthier social media reform: the big scale view." International journal of integrated care 12(4).	No	Focus not on PBE		
23	Balaguer, M. L. (2018). "Trabajo en plataformas digitales en España: primeras sentencias y primeras discrepancias." Labour & Law Issues, Journal Article 4(2): 51-78.	No	Language not English		

24	Barahona Orpinell, M., et al. (2016). "Accessibility Intra-centres Group of the Integrated Health Care Area of Left Barcelona." <i>International journal of integrated care</i> 16(6): 241.	No	Focus not on PBE		
25	Barbieri, M. (2019). "About riders as employees." <i>Labour & Law Issues - Journal Article</i> 5(2): 1-56.	No	Focus not on PBE		
26	Barker, M., et al. (2016). "Preconception and pregnancy: opportunities to intervene to improve women's diets and lifestyles." <i>Journal of developmental origins of health and disease</i> 7(3): 330-333.	No	Focus not on PBE		
27	Baronian, L. (2020). "Digital Platforms and the Nature of the Firm." <i>Journal of economic issues</i> 54(1): 214-232.	No	Focus not on PBE		
28	Bartenbach, J., et al. (2019). "Stahlbau unter Nutzung von BIM in einem heterogenen Softwareumfeld." <i>Der Stahlbau</i> 88(8): 786-795.	No	Language not English		
29	Batchelor, R., et al. (2012). "Challenges of ethical and legal responsibilities when technologies' uses and users change: social networking sites, decision-making capacity and dementia." <i>Ethics and information technology</i> 14(2): 99-108.	No	Focus not on PBE		
30	Baumel, A., et al. (2018). "Digital Peer-Support Platform (7Cups) as an Adjunct Treatment for Women With Postpartum Depression: Feasibility, Acceptability, and Preliminary Efficacy Study." <i>JMIR mHealth and uHealth</i> 6(2): e38-e38.	No	Focus not on PBE		
31	Beliz, G., et al. (2019). "Harnessing the opportunities of inclusive technologies in a global economy." <i>Economics. The open-access, open-assessment e-journal</i> 13.	No	Focus not on PBE		
32	Benjamin, L. S. and M. M. Carney (2018). "Furthering the Value of the Emergency Department Beyond Its Walls: Transitions to the Medical Home for Pediatric Emergency Patients." <i>Clinical pediatric emergency medicine</i> 19(3): 243-251.	No	Focus not on PBE		
33	Berg, L., et al. (2020). "Trust and the don't-want-to-complain bias in peer-to-peer platform markets." <i>International journal of consumer studies</i> 44(3): 220-231.	Doubt	Focus not on PBE	No	Focus on trust mechanisms
34	Bertino, A., et al. (2020). "Leveraging Concepts in Open Access Publications." <i>Journal of data mining and digital humanities - Journal Article</i> 2019.	No	Focus not on PBE		
35	Bindal, V., et al. (2015). "Review of contemporary role of robotics in bariatric surgery." <i>Journal of minimal access surgery</i> 11(1): 16-21.	No	Focus not on PBE		
36	Birgillito, G. and M. Birgillito (2018). "Algorithms and ratings: tools to manage labour relations. Proposals to renegotiate labour conditions for platform drivers." <i>Labour & Law Issues - Journal Article</i> 4(2): 25-50.	Yes		No	Focus on employment issues

37	Borst, J. and D. G. González (2019). "Narrative Constructions of Online Imagined Afro-diasporic Communities in Spain and Portugal." <i>Open Cultural Studies</i> 3(1): 286-307.	No	Focus not on PBE		
38	Borsuk, A. (2020). "Digital visions and revisions: an interview with and response to Robert Delamere." <i>Research in drama education</i> 25(1): 26-37.	Yes		No	Different PBE definition
39	Broekhuizen, T. L. J., et al. (2019). "Digital platform openness: Drivers, dimensions and outcomes." <i>Journal of business research</i> .	No	Duplicate		
40	Broekhuizen, T. L. J., et al. (2020). "Digital platform openness: Drivers, dimensions and outcomes." <i>Journal of business research</i> .	Yes		No	Different PBE definition
41	Bucci, S., et al. (2019). "The digital revolution and its impact on mental health care." <i>Psychology and psychotherapy</i> 92(2): 277-297.	No	Focus not on PBE		
42	Burgdorf, K. S., et al. (2016). "Digital questionnaire platform in the Danish Blood Donor Study." <i>Computer methods and programs in biomedicine</i> 135: 101-104.	No	Focus not on PBE		
43	Burgdorf, K. S., et al. (2016). "Digital questionnaire platform in the Danish Blood Donor Study." <i>Computer methods and programs in biomedicine</i> 135: 101-104.	No	Duplicate		
44	Cane, M. and C. Parra (2020). "Digital platforms: mapping the territory of new technologies to fight food waste." <i>British Food Journal</i> 122(5): 1647-1669.	No	Focus not on PBE		
45	Cane, M. and C. Parra (2020). "Digital platforms: mapping the territory of new technologies to fight food waste." <i>British Food Journal</i> 122(5): 1647-1669.	No	Duplicate		
46	Cano, Á. M., et al. (2018). "Telemedicine may fail if it is not adapted to patients." <i>Journal of negative & no positive results</i> 3(4): 260-267.	No	Focus not on PBE		
47	Cantador, I., et al. (2020). "Exploiting Open Data to analyze discussion and controversy in online citizen participation." <i>Information Processing & Management</i> 57(5): 102301.	No	Focus not on PBE		
48	Caprotti, F. and D. Liu (2020). "Emerging platform urbanism in China: Reconfigurations of data, citizenship and materialities." <i>Technological forecasting & social change</i> 151: 119690.	No	Focus not on PBE		
49	Cardoso, J., et al. (2018). "A Transformerless Single-Phase Current Source Inverter Topology and Control for Photovoltaic Applications." <i>Energies (Basel)</i> 11(8): 2011.	No	Focus not on PBE		
50	Carlson, E. B. (2019). "Please Sign Here (And Share It To Your Facebook and Twitter Feeds): Online Petitions and Inventing for Circulation." <i>Computers and composition</i> 52: 175-194.	No	Focus not on PBE		
51	Carro, P. L., et al. (2018). "Markov mode-multiplexing mode in OFDM outphasing transmitters." <i>EURASIP journal on wireless communications and networking</i> 2018(1): 1-11.	No	Focus not on PBE		

52	Carstens, D. (2017). "A SCHIZOANALYTICAL PRAXIS FOR SOCIAL JUSTICE EDUCATION." Education as change 21(2): 25-44.	No	Focus not on PBE		
53	Chambers, D., et al. (2019). "Digital and online symptom checkers and assessment services for urgent care to inform a new digital platform: a systematic review." Health services and delivery research 7(29): 1-88.	No	Focus not on PBE		
54	Chan, L., et al. (2020). "From Likes to Quit Attempts: A Review of Evaluation Metrics Used in Digital and Traditional Tobacco Control Campaigns." Journal of medical Internet research	No	Focus not on PBE		
55	Chan, L., et al. (2020). "Review of Evaluation Metrics Used in Digital and Traditional Tobacco Control Campaigns." Journal of medical Internet research 22(8): e17432-e17432.	No	Duplicate		
56	Chang, H.-H. (2017). "THE ECONOMIC EFFECTS OF UBER ON TAXI DRIVERS IN TAIWAN." Journal of competition law & economics 13(3): 475-500.	No	Focus not on PBE		
57	Chen, T.-Y., et al. (2016). "A user's personality prediction approach by mining network interaction behaviors on Facebook." Online information review 40(7): 913-937.	No	Focus not on PBE		
58	Cheyne, C. and M. Imran (2016). "Shared transport: Reducing energy demand and enhancing transport options for residents of small towns." Energy research & social science 18: 139-150.	No	Focus not on PBE		
59	Chibanda, D. (2018). "Programmes that bring mental health services to primary care populations in the international setting." International review of psychiatry (Abingdon, England) 30(6): 170-181.	No	Focus not on PBE		
60	Choi, A. A., et al. (2019). "When Seeing Helps Believing: The Interactive Effects of Previews and Reviews on E-Book Purchases." Information Systems Research 30(4): 1164-1183.	No	Focus not on PBE		
61	Choquet, E. and N. M. Osorio Ruiz (2020). "Proximisation discursive et co-construction de communauté sur Twitch." SHS web of conferences 78: 1012.	No	Language not English		
62	Clarke, S. J., et al. (2017). "EscapED: A Framework for Creating Educational Escape Rooms and Interactive Games to For Higher/Further Education." International journal of serious games 4(3).	No	Focus not on PBE		
63	Cobb, D. J. (2019). "Panacea or nostrum? Open Educational Resources and the recontextualisation of pedagogy." International studies in sociology of education 28(1): 27-45.	No	Focus not on PBE		
64	Coiquaud, U. and I. Martin (2020). "Acces a la justice des travailleurs de plateformes numeriques: Reponses contrastees des tribunaux canadiens et americains." Relations industrielles (Québec, Québec) 75(3): 582.	No	Language not English		
65	Colàs-Neila, E. (2019). "Service provision through digital platforms in Spanish case law. Employees or self-employed?" Labour & Law Issues - Journal Article 5(1): 18-46.	No	Language not English		

66	Connolly, K. (2017). "Putting the citizen at the centre of accessing information about health and health services." <i>International journal of integrated care</i> 17(5): 487.	No	Focus not on PBE		
67	Craven, M. P., et al. (2019). "Try to see it my way: exploring the co-design of visual presentations of wellbeing through a workshop process." <i>Perspectives in public health</i> 139(3): 153-161.	No	Focus not on PBE		
68	Crowe, S., et al. (2018). "The LiveWell Dorset behaviour change system." <i>Perspectives in public health</i> 138(2): 83-84.	No	Focus not on PBE		
69	Cuenot, M. and W. Sherlaw (2019). "ParticipaTIC: Lessons from developing accessible on-line training for disabled people's leaders." <i>European Journal of Public Health</i> 29(Supplement_4).	No	Focus not on PBE		
70	Czernek, K., et al. (2018). "Trust in the Sharing Economy." <i>Gospodarka narodowa (Warsaw, Poland : 1990)</i> 295(3): 23-48.	No	Focus not on PBE		
71	Damtew, E., et al. (2018). "Diagnosis of management of bacterial wilt and late blight in potato in Ethiopia: A systems thinking perspective." <i>NJAS - Wageningen journal of life sciences</i> 86-87: 12-24.	No	Focus not on PBE		
72	Das, J. K., et al. (2016). "Interventions for Adolescent Substance Abuse: An Overview of Systematic Reviews." <i>Journal of adolescent health</i> 59(4): S61-S75.	No	Focus not on PBE		
73	Davidson, S. (2017). "Public affairs practice and lobbying inequality: Reform and regulation of the influence game." <i>Journal of public affairs</i> 17(4): e1665-n/a.	No	Focus not on PBE		
74	Davis, A. C., et al. (2020). "A Digital Pornography Literacy Resource Co-Designed With Vulnerable Young People: Development of "The Gist"." <i>Journal of medical Internet research</i> 22(6): e15964-e15964.	No	Focus not on PBE		
75	Davis, A. C., et al. (2020). "The Gist: A Digital Pornography Literacy Resource Co-Designed With Vulnerable Young People." <i>Journal of medical Internet research</i>	No	Duplicate		
76	de Reuver, G. A., et al. (2020). "Digital platforms and responsible innovation: expanding value sensitive design to overcome ontological uncertainty." <i>Ethics and information technology</i> 22(3): 257-267.	Yes		yes	
77	Delina, R., et al. (2012). "Trust building electronic services as a crucial self-regulation feature of Digital Business Ecosystems." <i>Journal of systems integration</i> (2010) 3(2): 29-38.	Yes		no	Focus on trust mechanisms
78	Demestichas, K. and E. Daskalakis (2020). "Information and Communication Technology Solutions for the Circular Economy." <i>Sustainability (Basel, Switzerland)</i> 12(18): 7272.	No	Focus not on PBE		
79	Deniz Kozan, M., et al. (2016). "Commercial articulated vehicle electromagnetic compatibility testing for emission source identification and mitigation." <i>International journal of RF and microwave computer-aided engineering</i> 26(4): 317-321.	No	Focus not on PBE		

80	Derdeyn, J. and W. Laleman (2018). "Current role of endoscopic cholangioscopy." <i>Current opinion in gastroenterology</i> 34(5): 301-308.	No	Focus not on PBE		
81	Dermott, M. (2019). "Robots and AR: towards a platform economy for construction." <i>Journal of information technology in construction</i> 24: 527-539.	Yes		No	Focus on construction
82	Deschênes, M. and T. Laferrière (2019). "Le codesign d'une plateforme numérique fondé sur des principes au service de l'agentivité des enseignantes et des enseignants en contexte de développement professionnel Co-Design of a Digital Platform Based on Principles Supporting Teachers' Agency in the Context of Professional Development." <i>Canadian journal of learning and technology</i> 45(1).	No	Language not English		
83	Di Ludovico, D. and V. Fabietti (2018). "Strategic Environmental Assessment, key issues of its effectiveness. The results of the Speedy Project." <i>Environmental impact assessment review</i> 68: 19-28.	Doubt	Vague PBE definition	No	Different PBE definition
84	Dixon, B. E., et al. (2017). "Measuring Practicing Clinicians' Information Literacy An Exploratory Analysis in the Context of Panel Management." <i>Applied clinical informatics</i> 8(1): 149-161.	No	Focus not on PBE		
85	Dixon, B. E., et al. (2017). "Measuring Practicing Clinicians' Information Literacy." <i>Applied clinical informatics</i> 26(1): 149-161.	No	Duplicate		
86	Dong, J. Q. (2019). "Moving a mountain with a teaspoon: Toward a theory of digital entrepreneurship in the regulatory environment." <i>Technological forecasting & social change</i> 146(1): 923-930.	No	Focus not on PBE		
87	Doyle, J., et al. (2017). "Designing a Proactive, Person-Centred, Digital Integrated Care System." <i>International journal of integrated care</i> 17(5): 211.	No	Focus not on PBE		
88	Drahokoupil, J. and M. Jepsen (2017). "The digital economy and its implications for labour. 1. The platform economy." <i>Transfer (Brussels, Belgium)</i> 23(2): 103-107.	No	Focus not on PBE		
89	Eid Mohamed, B., et al. (2017). "A computer-based participatory model for customization in the UAE housing market." <i>Journal of Enterprise Information Management</i> 30(1): 17-29.	No	Focus not on PBE		
90	Ersoy, M. and A. Güneşli (2016). "Social Networking as a Tool for Lifelong Learning with Orthopedically Impaired Learners." <i>Educational technology & society</i> 19(1): 41-52.	No	Focus not on PBE		
91	Espelt, R. (2020). "Agroecology presumption: The role of CSA networks." <i>Journal of rural studies</i> 79: 269-275.	No	Focus not on PBE		
92	Faggini, M., et al. (2018). "Pursuing Sustainability for Healthcare through Digital Platforms." <i>Sustainability (Basel, Switzerland)</i> 11(1): 165.	Doubt	Vague PBE definition	no	No challenges discussed

93	Faiman, M., et al. (2019). "707-P: Diabetes Education through Shared Medical Appointment: Utilizing Digital Health—A Comparison of Platforms and Integrating Devices with Result Review." Diabetes (New York, N.Y.) 68(Supplement 1): 707.	No	Focus not on PBE		
94	Fatahi, M., et al. (2018). "Rate-coded DBN: An online strategy for spike-based deep belief networks." Biologically inspired cognitive architectures 24: 59-69.	Doubt	Vague PBE definition	no	Focus on algorithms
95	Fehrenbacher, C., et al. (2020). "Referral to Digital Parent Training in Primary Care: Facilitators and Barriers." Clinical practice in pediatric psychology 8(3): 268-277.	No	Focus not on PBE		
96	Feit, E. M., et al. (2013). "Fusing Aggregate and Disaggregate Data with an Application to Multiplatform Media Consumption." Journal of marketing research 50(3): 348-364.	No	Focus not on PBE		
97	Feng, Q., et al. (2019). "A survey on privacy protection in blockchain system." Journal of network and computer applications 126: 45-58.	No	Focus not on PBE		
98	Ferrando, M., et al. (2019). "Qualitative research on the factors affecting transferability of digital solutions for integrated care." International journal of integrated care 19(4): 236.	No	Focus not on PBE		
99	Figay, N., et al. (2012). "Interoperability framework for dynamic manufacturing networks." Computers in Industry 63(8): 749-755.	Yes		no	Different PBE definition
100	Flanagan, F. (2018). "Theorising the gig economy and home-based service work." Journal of industrial relations 61(1): 57-78.	No	Focus not on PBE		
101	Foster, C. and S. Azmeh (2020). "Latecomer Economies and National Digital Policy: An Industrial Policy Perspective." The Journal of development studies 56(7): 1247-1262.	No	Focus not on PBE		
102	Frempong, J., et al. (2018). "Effects of Waste Management Customer Online Value Co-Creation on Sanitation Attitude and Advocacy: A Customer-Enterprise Dyadic Perspective." Sustainability (Basel, Switzerland) 10(7): 2557.	No	Focus not on PBE		
103	Funk, E., et al. (2018). "Blockchain Technology: A Data Framework to Improve Validity, Trust, and Accountability of Information Exchange in Health Professions Education." Academic medicine 93(12): 1791-1794.	No	Focus not on PBE		
104	Gandini, A. (2018). "Labour process theory and the gig economy." Human relations (New York) 72(6): 1039-1056.	No	Focus not on PBE		
105	Garety, P. A., et al. (2017). "SlowMo, a digital therapy targeting reasoning in paranoia, versus treatment as usual in the treatment of people who fear harm from others: study protocol for a randomised controlled trial." Trials 18(1): 510-510.	No	Focus not on PBE		
106	Garud, R., et al. (2020). "Liminal movement by digital platform-based sharing economy ventures: The case of Uber Technologies." Strategic management journal.	Yes		yes	

107	Geneviève, L. D., et al. (2019). "Participatory Disease Surveillance Systems: Ethical Framework." <i>Journal of medical Internet research</i> 21(5): e12273-e12273.	Doubt	Vague PBE definition	yes	
108	Glăveanu, V. P., et al. (2018). "Making Sense of Refugees Online: Perspective Taking, Political Imagination, and Internet Memes." <i>The American behavioral scientist (Beverly Hills)</i> 62(4): 440-457.	No	Focus not on PBE		
109	Goggin, G., et al. (2019). "Data and digital rights: recent Australian developments." <i>Internet policy review</i> 8(1).	No	Focus not on PBE		
110	Goggin, G., et al. (2019). "Data and digital rights: recent Australian developments." <i>Internet policy review</i> 8(1).	No	Focus not on PBE		
111	Golan, G. J. (2019). "New Perspectives on International Public Relations: Engaging Foreign Stakeholders." <i>The American behavioral scientist (Beverly Hills)</i> 63(12): 1599-1602.	No	Focus not on PBE		
112	Goswami, K., et al. (2017). "Impact of reviewer social interaction on online consumer review fraud detection." <i>Journal of big data</i> 4(1): 1-19.	No	Focus not on PBE		
113	Grates, M. G., et al. (2019). "New Perspectives on User Participation in Technology Design Processes: An Interdisciplinary Approach." <i>The Gerontologist</i> 59(1): 45-57.	No	Focus not on PBE		
114	Hale, S. A., et al. (2018). "How digital design shapes political participation: A natural experiment with social information." <i>PloS one</i> 13(4): e0196068-e0196068.	No	Focus not on PBE		
115	Han, D. (2017). "The Market Value of Who We Are: The Flow of Personal Data and Its Regulation in China." <i>Media and communication (Lisboa)</i> 5(2): 21-30.	No	Focus not on PBE		
116	Han, Y. (2020). "A Tripartite Evolutionary Game Analysis of Enterprises' Behaviour in the Platform Ecosystem." <i>Discrete dynamics in nature and society</i> 2020: 1-10.	Yes		yes	
117	Havermans, B. M., et al. (2018). "Process Evaluation of a Digital Platform-Based Implementation Strategy Aimed at Work Stress Prevention in a Health Care Organization." <i>Journal of occupational and environmental medicine</i> 60(9): e484-e491.	No	Focus not on PBE		
118	Havermans, B. M., et al. (2018). "Process evaluation of a digital platform-based implementation strategy aimed at work stress prevention in a health care organization." <i>Journal of occupational and environmental medicine</i> 60(9): e484-e491.	No	Duplicate		
119	Hazée, S., et al. (2020). "Why customers and peer service providers do not participate in collaborative consumption." <i>Journal of service management</i> 31(3): 397-419.	Yes		yes	
120	He, S., et al. (2020). "The Story of #GetMePPE and GetUsPPE.org to Mobilize Health Care Response to COVID-19: Rapidly Deploying Digital Tools for Better Health Care." <i>Journal of medical Internet research</i> 22(7): e20469-e20469.	No	Focus not on PBE		

121	Heikka, T., et al. (2019). "Three Stages of Innovation in Participatory Journalism—Co-initiating, Co-sensing, and Co-creating News in the Chicago School Cuts Case." <i>Journal of the knowledge economy</i> 10(2): 437-464.	No	Focus not on PBE		
122	Hein, A., et al. (2019). "Digital platform ecosystems." <i>Electronic Markets</i> 30(1): 87-98.	Yes		yes	
123	Helles, R. and M. Flyverbom (2019). "Meshes of Surveillance, Prediction, and Infrastructure: On the Cultural and Commercial Consequences of Digital Platforms." <i>Surveillance & society</i> 17(1/2): 34-39.	Doubt	Vague PBE definition	no	Focus not on PBE and its challenges
124	Henderson, D. (2020). "Demand-side broadband policy in the context of digital transformation: An examination of SME digital advisory policies in Wales." <i>Telecommunications policy</i> 44(9): 102024-102024.	No	Focus not on PBE		
125	Herdon, M., et al. (2012). "Digital business ecosystem prototyping for SMEs." <i>Journal of systems and information technology</i> 14(4): 286-301.	Yes		no	Focus not on PBE and its challenges
126	Hevner, A. and O. Malgonde (2019). "Effectual application development on digital platforms." <i>Electronic Markets</i> 29(3): 407-421.	Doubt	Vague PBE definition	yes	
127	Hickey, H. (2020). "Dedicated Poster Abstracts." <i>Canadian medical education journal</i> 11(2): e154-e273.	No	Focus not on PBE		
128	Hilbolling, S., et al. (2019). "Complementors as connectors: managing open innovation around digital product platforms." <i>R & D management</i> 50(1): 18-30.	Yes		yes	
129	Hildebrandt, B., et al. (2018). "Sharing Yet Caring." <i>Business & Information Systems Engineering</i> 60(3): 227-241.	Yes		yes	
130	Hildebrandt, B., et al. (2018). "Sharing Yet Caring: Mitigating Moral Hazard in Access-Based Consumption through IS-Enabled Value Co-Capturing with Consumers." <i>Business & Information Systems Engineering</i> 60(3): 227-241.	No	Duplicate		
131	Hoek, R. J. A., et al. (2017). "Stress Prevention@Work: A study protocol for the evaluation of a multifaceted integral stress prevention strategy to prevent employee stress in a healthcare organization: A cluster controlled trial." <i>BMC public health</i> 18(1).	No	Focus not on PBE		
132	Hoek, R. J. A., et al. (2018). "Stress Prevention@Work: A study protocol for the evaluation of a multifaceted integral stress prevention strategy to prevent employee stress in a healthcare organization: a cluster controlled trial." <i>BMC public health</i> 18(1): 26-26.	No	Duplicate		

133	Holmes, M. M., et al. (2019). "The Use of Measurement Systems to Support Patient Self-Management of Long-Term Conditions: An Overview of Opportunities and Challenges." Patient related outcome measures 10: 385-394.	No	Focus not on PBE		
134	Holt, A. and P. Diggins (2010). "Open for business: bringing digital engagement and strategy to life." Strategic HR Review 9(6): 16-21.	No	Focus not on PBE		
135	Honic, M., et al. (2019). "Data- and stakeholder management framework for the implementation of BIM-based Material Passports." Journal of Building Engineering 23: 341-350.	No	Focus not on PBE		
136	Hsieh, Y.-J. and Y. J. Wu (2019). "Entrepreneurship through the platform strategy in the digital era: Insights and research opportunities." Computers in Human Behavior 95: 315-323.	Yes		no	Different PBE definition
137	Hswen, Y., et al. (2019). "Using Twitter to Detect Psychological Characteristics of Self-Identified Persons With Autism Spectrum Disorder: A Feasibility Study." JMIR mHealth and uHealth 7(2): e12264-e12264.	No	Focus not on PBE		
138	Hua, J. and R. Shaw (2020). "Corona Virus (COVID-19) "Infodemic" and Emerging Issues through a Data Lens: The Case of China." International journal of environmental research and public health 17(7): 2309.	No	Focus not on PBE		
139	Huang, N., et al. (2020). "Unemployment and Worker Participation in the Gig Economy: Evidence from an Online Labor Market." Information Systems Research 31(2): 431-448.	No	Focus not on PBE		
140	Ilchenko, N. B., et al. (2019). "Developing Retail Trade Networks of the Mass-Market Segment of the Fashion Industry in Ukraine." Biznes inform (Multilingual ed.) 11(502): 407-416.	No	Focus not on PBE		
141	Inoue, et al. (2019). "Effectiveness of Ecosystem Strategies for the Sustainability of Marketplace Platform Ecosystems." Sustainability (Basel, Switzerland) 11(20): 5866.	Yes		No	Focus on logistics
142	Iqbal, S. (2016). "Insights of School Head About Marketing Education Services Through Digital Media." Journal of education and educational development 3(1): 52-73.	No	Focus not on PBE		
143	Ivancheva, M. P., et al. (2020). "Conflicting logics of online higher education." British journal of sociology of education 41(5): 608-625.	No	Focus not on PBE		
144	Ivancheva, M. P., et al. (2020). "Conflicting logics of unbundled higher education in an unequal society." British journal of sociology of education 41(5): 608-625.	No	Duplicate		
145	Jackson, J. E. and J. Hallam (2020). "Against all odds-why UK mothers' breastfeeding beyond infancy are turning to their international peers for emotional and informative support." Health care for women international: 1-17.	No	Focus not on PBE		
146	Jain, V., et al. (2019). "Digital Storytelling as a Solution to Destigmatize Products: Case of Women Lingerie from India." Journal of business and management 25(1).	No	Focus not on PBE		

147	Jamieson, N. and T. Lang (2019). "PO 8529 INTRODUCING A UNIQUE RESEARCH CAPACITY DEVELOPMENT PLATFORM SUPPORTING PREPAREDNESS FOR EFFECTIVELY COMBATING EPIDEMIC OUTBREAKS." <i>BMJ global health</i> 4(Suppl 3): A50-A50.	No	Focus not on PBE		
148	Janssen, M. (2015). "Foundation Support for Media: a Boon with Strings Attached." <i>Society (New Brunswick)</i> 52(6): 561-564.	No	Focus not on PBE		
149	Jean, R.-J. B., et al. (2020). "Antecedents and outcomes of digital platform risk for international new ventures' internationalization." <i>Journal of world business : JWB</i> 55(1): 101021.	Doubt	Vague PBE definition	no	Focus on digital platform
150	Jin, R., et al. (2019). "Scientometric analysis of BIM-based research in construction engineering and management." <i>Engineering, construction, and architectural management</i> 26(8): 1750-1776.	No	Focus not on PBE		
151	Joachim, C., et al. (2018). "Cohort profile: the Martinique Cancer Registry and the quality of life prostate cancer cohort (QoL Prostate-MQ): challenges and prospects for reducing disparities in the Caribbean." <i>BMJ open</i> 8(7): e021540-e021540.	No	Focus not on PBE		
152	Kabakova, O., et al. (2016). "Strategizing for Financial Technology Platforms: Findings from Four Russian Case Studies." <i>Psychology & marketing</i> 33(12): 1106-1111.	Yes		yes	
153	Kanter, B. M., et al. (2017). "Challenges in X-Ray Medical Diagnosis." <i>Biomedical engineering</i> 50(6): 410-415.	No	Focus not on PBE		
154	Kanter, B. M., et al. (2017). "Challenges in X-Ray Medical Diagnosis." <i>Biomedical engineering</i> 50(6): 410-415.	No	Focus not on PBE		
155	Kaur, P., et al. (2018). "ATM Card Cloning and Ethical Considerations." <i>Science and engineering ethics</i> 25(5): 1311-1320.	No	Focus not on PBE		
156	Kausar, S., et al. (2020). "ProSOUL: A Framework to Identify Propaganda from Online Urdu Content." <i>IEEE access - Journal Article</i> : 1-1.	No	Focus not on PBE		
157	Kaye, R., et al. (2017). "From Connected Care to Integrated Care – A work in Progress." <i>International journal of integrated care</i> 17(5): 448.	No	Focus not on PBE		
158	Kenney, M., et al. (2019). "Platforms and industrial change." <i>Industry and innovation</i> 26(8): 871-879.	Yes		No	Research design not defined
159	Kenney, M., et al. (2019). "Platforms and industrial change." <i>Industry and innovation</i> 26(8): 871-879.	No	Duplicate		
160	Kern, T., et al. (2019). "Digitalizing the Paints and Coatings Development Process." <i>Processes</i> 7(8): 539.	No	Focus not on PBE		

161	Khan, L. M. (2019). "THE SEPARATION OF PLATFORMS AND COMMERCE." Columbia law review 119(4): 973-1098.	Doubt	Vague PBE definition	no	Focus on jurisdictional problems
162	Khanagha, S., et al. (2020). "Mutualism and the dynamics of new platform creation: A study of cisco and fog computing." Strategic management journal.	Yes		yes	
163	Khanna, A. S., et al. (2018). "Using Partially-Observed Facebook Networks to Develop a Peer-Based HIV Prevention Intervention: Case Study." Journal of medical Internet research 20(9): e11652-e11652.	No	Focus not on PBE		
164	Khuntia, J., et al. (2017). "How Service Offerings and Operational Maturity Influence the Viability of Health Information Exchanges." Production and operations management 26(11): 1989-2005.	Yes		yes	
165	Kim, J. (2018). "Market entry strategy for a digital platform provider." Baltic journal of management 13(3): 390-406.	Yes		yes	
166	Kleeman, D. (2016). "Books and Reading are Powerful with Kids, but Content Discovery is Challenging." Publishing research quarterly 32(1): 38-43.	No	Focus not on PBE		
167	Kolomytseva, O., et al. (2019). "Management of the innovative ecosystem development environment." E3S web of conferences 91: 8067.	No	Focus not on PBE		
168	Komljenovic, J. (2018). "Linkedin, platforming labour, and the new employability mandate for universities." Globalisation, societies and education 17(1): 28-43.	No	Focus not on PBE		
169	Komorowski, M., et al. (2016). "Lowering the barriers for online cross-media usage: Scenarios for a Belgian single sign-on solution." Telematics and informatics 33(4): 916-924.	No	Focus not on PBE		
170	Korhonen, H., et al. (2017). "The Core Interaction of Platforms: How Startups Connect Users and Producers." Technology innovation management review 7(9): 17-29.	Yes		Yes	
171	Koseva, P. (2017). "Internationalizing campus partners." Journal of international students 7(3): 876.	No	Focus not on PBE		
172	Krausz, M., et al. (2020). "Emergency Response to COVID-19 in Canada: Platform Development and Implementation for eHealth in Crisis Management." JMIR public health and surveillance 6(2): e18995-e18995.	No	Focus not on PBE		
173	Kulandaivelu, Y., et al. (2018). "Exploring the Needs of Adolescents With Sickle Cell Disease to Inform a Digital Self-Management and Transitional Care Program: Qualitative Study." JMIR pediatrics and parenting 1(2): e11058-e11058.	No	Focus not on PBE		
174	Kullenberg, C., et al. (2016). "What Is Citizen Science? – A Scientometric Meta-Analysis." PloS one 11(1): e0147152-e0147152.	No	Focus not on PBE		

175	Kumar, N., et al. (2018). "Exit, Voice, and Response on Digital Platforms: An Empirical Investigation of Online Management Response Strategies." <i>Information Systems Research</i> 29(4): 849-870.	No	Focus not on PBE		
176	Kumar, S., et al. (2018). "Research in Operations Management and Information Systems Interface." <i>Production and operations management</i> 27(11): 1893-1905.	No	Focus not on PBE		
177	Laakso, E. L., et al. (2012). "Cyber-management of people with chronic disease: A potential solution to eHealth challenges." <i>Health education journal</i> 71(4): 483-490.	No	Focus not on PBE		
178	Lai, C.-H., et al. (2020). "Use of a Mobile Anonymous Question-Raising System to Assist Flipped-Classroom Learning." <i>International journal of interactive mobile technologies</i> 14(3): 66-81.	No	Focus not on PBE		
179	Lakshminarayanan, M., et al. (2020). "Delivery of perinatal mental health services by training lay counselors using digital platforms." <i>Asian journal of psychiatry</i> 54: 102277-102277.	No	Focus not on PBE		
180	Lassandari, A. (2018). "Collective enhancement of labour protection and online platforms: the beginning of a difficult path." <i>Labour & Law Issues - Journal Article</i> 4(1).	No	Focus not on PBE		
181	Leeuwis, C., et al. (2018). "Reflections on the potential of virtual citizen science platforms to address collective action challenges : Lessons and implications for future research." <i>NJAS - Wageningen journal of life sciences</i> 86-87: 146-157.	No	Focus not on PBE		
182	Leeuwis, C., et al. (2018). "Reflections on the potential of virtual citizen science platforms to address collective action challenges: Lessons and implications for future research." <i>NJAS - Wageningen journal of life sciences</i> 86-87: 146-157.	No	Duplicate		
183	Leoni, G. and L. D. Parker (2019). "Governance and control of sharing economy platforms: Hosting on Airbnb." <i>The British accounting review</i> 51(6): 100814.	No	Focus not on PBE		
184	Letchworth, P. M., et al. (2017). "Improving non-technical skills (teamwork) in post-partum haemorrhage: A grouped randomised trial." <i>European journal of obstetrics & gynecology and reproductive biology</i> 217: 154-160.	No	Focus not on PBE		
185	Lewandowski, M., et al. (2019). "DIGITAL PLATFORMS FOR POSTAL SERVICES IN EU AND JAPAN." <i>European integration studies (Kaunas University of Technology)</i> (13): 117-130.	No	Focus not on PBE		
186	Li, Z., et al. (2018). "Contract design on digital platform for the risk-averse retailer with moral hazard: Wholesale price vs two-part tariff." <i>Kybernetes</i> 47(4): 716-741.	No	Focus not on PBE		
187	Ligon, E., et al. (2019). "What explains low adoption of digital payment technologies? Evidence from small-scale merchants in Jaipur, India." <i>PloS one</i> 14(7): e0219450-e0219450.	No	Focus not on PBE		
188	Ligon, E., et al. (2019). "What explains low adoption of digital payment technologies? Evidence from small-scale merchants in Jaipur, India." <i>PloS one</i> 14(7): e0219450-e0219450.	No	Duplicate		
189	Lior, N. (2020). "Multimedia Shakespeare editions: Making Shakespeare accessible/making an accessible Shakespeare." <i>Research in drama education</i> 25(1): 125-142.	No	Focus not on PBE		

190	Litvinenko, V. S. (2019). "Digital Economy as a Factor in the Technological Development of the Mineral Sector." <i>Natural resources research</i> (New York, N.Y.) 29(3): 1521-1541.	No	Focus not on PBE		
191	Liu, W. and J. Huang (2017). "Event-triggered cooperative robust practical output regulation for a class of linear multi-agent systems." <i>Automatica</i> (Oxford) 85: 158-164.	No	Focus not on PBE		
192	Liyanage, S., et al. (2019). "Flexible Mobility On-Demand: An Environmental Scan." <i>Sustainability</i> (Basel, Switzerland) 11(5): 1262.	No	Focus not on PBE		
193	Lovari, A. (2020). "Spreading (Dis)Trust: Covid-19 Misinformation and Government Intervention in Italy." <i>Media and communication</i> (Lisboa) 8(2): 458-461.	No	Focus not on PBE		
194	Lupton, D. (2016). "The use and value of digital media for information about pregnancy and early motherhood: a focus group study." <i>BMC pregnancy and childbirth</i> 16(1): 171-171.	No	Focus not on PBE		
195	Lwin, M. O., et al. (2014). "A 21st century approach to tackling dengue: Crowdsourced surveillance, predictive mapping and tailored communication." <i>Acta tropica</i> 130: 100-107.	No	Focus not on PBE		
196	Maffey, G., et al. (2016). "Can digital reinvention of ecological monitoring remove barriers to its adoption by practitioners? A case study of deer management in Scotland." <i>Journal of environmental management</i> 184(Pt 2): 186-195.	No	Focus not on PBE		
197	Magnussen, R., et al. (2017). "Mobile Eye Tracking Methodology in Informal E-Learning in Social Groups in Technology-Enhanced Science Centres." <i>Electronic journal of e-Learning</i> 15(1): 46.	No	Focus not on PBE		
198	Maia, F., et al. (2020). "Auditory training app validation." <i>European Journal of Public Health</i> 30(Supplement_2).	No	Focus not on PBE		
199	Mamais, S. and G. Theodorakopoulos (2017). "Behavioural Verification: Preventing Report Fraud in Decentralized Advert Distribution Systems." <i>Future internet</i> 9(4): 88.	No	Focus not on PBE		
200	Mao, J., et al. (2019). "Networked recursive filtering for time-delayed nonlinear stochastic systems with uniform quantisation under Round-Robin protocol." <i>International journal of systems science</i> 50(4): 871-884.	No	Focus not on PBE		
201	Markman, G. D., et al. (2019). "The Who, Where, What, How and When of Market Entry." <i>Journal of management studies</i> 56(7): 1241-1259.	No	Focus not on PBE		
202	Martinez-Martin, N. and K. Kreitmair (2018). "Ethical Issues for Direct-to-Consumer Digital Psychotherapy Apps: Addressing Accountability, Data Protection, and Consent." <i>JMIR mental health</i> 5(2): e32-e32.	Yes		No	PBE not defined the same
203	Marwaha, S. and C. M. Bacchus (2019). "Empowering residents to drive societal change: tips for creating an effective health advocacy curriculum." <i>Medical education</i> 53(12): 1173-1175.	No	Focus not on PBE		
204	Mazaheri, E., et al. (2020). "Research Directions in information Systems Field, Current Status and Future Trends." <i>AJIS. Australasian journal of information systems - Journal Article</i> 24.	No	Focus not on PBE		

205	Mazaheri, E., et al. (2020). "Research Directions in information Systems Field, Current Status and Future Trends: A Meta-Analysis of AIS Basket of Top Journals." <i>AJIS. Australasian journal of information systems</i> 24.	No	Duplicate		
206	Mc Veigh, C., et al. (2019). "Healthcare professionals' views of palliative care for American war veterans with non-malignant respiratory disease living in a rural area: a qualitative study." <i>BMC palliative care</i> 18(1): 22-22.	No	Focus not on PBE		
207	McCabe, S. Q. (2019). "Intermediaries and the Market: Hans Rottenhammer's Use of Networks in the Copper Painting Market." <i>Arts (Basel)</i> 8(2): 75.	No	Focus not on PBE		
208	McCosker, A. (2018). "Engaging mental health online: Insights from beyondblue's forum influencers." <i>New media & society</i> 20(12): 4748-4764.	No	Focus not on PBE		
209	McCulloch, S., et al. (2017). "The role of networked learning in academics' writing." <i>Research in learning technology</i> 25: 1-13.	No	Focus not on PBE		
210	McPhee, C., et al. (2017). "Editorial: Platforms and Ecosystems." <i>Technology innovation management review</i> 7(9): 3-5.	No	Abstract missing		
211	Medina-Labrador, M., et al. (2020). "EFFICIENCY OF BIOMETRIC RECOGNITION TECHNOLOGY BASED ON TYPING DYNAMICS IN MOOC." <i>The Turkish online journal of distance education TOJDE</i> 21(Special): 79-87.	No	Focus not on PBE		
212	Meinert, E., et al. (2019). "Blockchain Implementation in Health Care: Protocol for a Systematic Review." <i>JMIR research protocols</i> 8(2): e10994-e10994.	No	Focus not on PBE		
213	Meireles, M. and P. J. G. Ribeiro (2020). "Digital Platform/Mobile App to Boost Cycling for the Promotion of Sustainable Mobility in Mid-Sized Starter Cycling Cities." <i>Sustainability (Basel, Switzerland)</i> 12(5): 2064.	No	Focus not on PBE		
214	Melián-González, S. and J. Bulchand-Gidumal (2018). "What type of labor lies behind the on-demand economy? New research based on workers' data." <i>Journal of management & organization</i> : 1-17.	No	Focus not on PBE		
215	Mensah, G. A. (2018). "Training in Cardiovascular Epidemiology and Prevention A 50-Year Journey From Makarska to Goa." <i>Global heart</i> 13(4): 355-362.	No	Duplicate		
216	Mensah, G. A. (2018). "Training in Cardiovascular Epidemiology and Prevention." <i>Global heart</i> 13(4): 355-362.	No	Focus not on PBE		
217	Mezhuyev, V., et al. (2019). "Evaluation of the Likelihood of Friend Request Acceptance in Online Social Networks." <i>IEEE access</i> 7: 75318-75329.	No	Focus not on PBE		
218	Miric, M. and L. B. Jeppesen (2020). "Does piracy lead to product abandonment or stimulate new product development?: Evidence from mobile platform-based developer firms." <i>Strategic management journal</i> .	Yes		Yes	

219	Mishra, S. R., et al. (2018). "A17044 Community health workers for non-communicable disease interventions in the digital age." <i>Journal of hypertension</i> 36 Suppl 3: e339-e339.	No	Duplicate		
220	Mishra, S. R., et al. (2019). "Combating non-communicable diseases: potentials and challenges for community health workers in a digital age, a narrative review of the literature." <i>Health policy and planning</i> 34(1): 55-66.	No	Focus not on PBE		
221	Mocanu, F., et al. (2018). "Digital Literacy Among Young Adults in Romania." <i>Management dynamics in the knowledge economy</i> 6(3): 449-470.	No	Focus not on PBE		
222	Møller, M. S., et al. (2019). "Participation through place-based e-tools: A valuable resource for urban green infrastructure governance?" <i>Urban forestry & urban greening</i> 40: 245-253.	No	Focus not on PBE		
223	Monahan, T. (2020). "Monopolizing mobilities: The data politics of ride-hailing platforms in US cities." <i>Telematics and informatics</i> 55: 101436.	No	Focus not on PBE		
224	Mone, G. (2014) The new digital medicine. 57, 18-20 DOI: 10.1145/2641227	No	Focus not on PBE		
225	Moreira, T. C. (2017). "The impact of new technologies in balancing private and family life with working time." <i>Labour & Law Issues</i> , 3(1): 1-31.	No	Focus not on PBE		
226	Moreno, A., et al. (2015). "Does social media usage matter? An analysis of online practices and digital media perceptions of communication practitioners in Europe." <i>Public relations review</i> 41(2): 242-253.	No	Focus not on PBE		
227	Morin, O., et al. (2013). "Digital Technology to Support Students' Socioscientific Reasoning about eEnvironmental Issues." <i>Journal of biological education</i> 47(3): 157.	No	Focus not on PBE		
228	Morin, O., et al. (2013). "Digital technology to support students' socioscientific reasoning about environmental issues." <i>Journal of biological education</i> 47(3): 157-165.	No	Duplicate		
229	Morin, O., et al. (2013). "Digital technology to support students' socio-scientific reasoning about environmental issues." <i>Journal of biological education</i> 47(3): 157-165.	No	Duplicate		
230	Moro Visconti, R. and D. Morea (2020). "Healthcare Digitalization and Pay-For-Performance Incentives in Smart Hospital Project Financing." <i>International journal of environmental research and public health</i> 17(7): 2318.	Yes		No	Focus not on PBE
231	Morris, N. P. (2020). "When Patients Appear in the News: Clinical Considerations for Mental Health Professionals." <i>Harvard review of psychiatry</i> 28(2): 127-132.	No	Focus not on PBE		
232	Muhardis, M., et al. (2019). "The respondent factors on the digital questionnaire responses." <i>REID (Research and Evaluation in Education)</i> 5(2): 144-151.	No	Focus not on PBE		

233	Muke, S. S., et al. (2019). "Acceptability and feasibility of digital technology for training community health workers to deliver brief psychological treatment for depression in rural India." Asian journal of psychiatry 45: 99-106.	No	Focus not on PBE		
234	Mukerji, M. and P. S. Roy (2019). "Platform Interactions and Emergence of an Organizational Field: Case Study on Ola." AJS. Australasian journal of information systems 23.	Yes		yes	
235	Müller, J. M. (2019). "Antecedents to Digital Platform Usage in Industry 4.0 by Established Manufacturers." Sustainability (Basel, Switzerland) 11(4): 1121.	Yes		yes	
236	Murakami Wood, D. and T. Monahan (2019). "Editorial: Platform Surveillance." Surveillance & society 17(1/2): 1-6.	No	Focus not on PBE		
237	Murphy, K. R., et al. (2016). "Design, implementation, and demographic differences of HEAL: a self-report health care leadership instrument." Journal of healthcare leadership 8: 51-59.	No	Focus not on PBE		
238	Mylonas, P., et al. (2019). "A Collaborative Pilot Platform for Data Annotation and Enrichment in Viticulture." Information (Basel) 10(4): 149.	No	Focus not on PBE		
239	Nambisan, S., et al. (2019). "The digital transformation of innovation and entrepreneurship: Progress, challenges and key themes." Research Policy 48(8): 103773.	No	Focus not on PBE		
240	Nesvåg, S. and J. R. McKay (2018). "Feasibility and Effects of Digital Interventions to Support People in Recovery From Substance Use Disorders: Systematic Review." Journal of medical Internet research 20(8): e255-e255.	No	Focus not on PBE		
241	Ngongo, P. B., et al. (2019). "PO 8254 LESSONS LEARNT FROM SCALING UP AN ONLINE SYSTEM FOR REVIEW AND MANAGEMENT OF PROTOCOLS IN SUB-SAHARAN AFRICA." BMJ global health 4(Suppl 3): A24-A24.	Doubt	Vague PBE definition	no	Text not available
242	Nordkvelle, Y. (2015). "Ethics, methods and diversity in the use of new media." seminar.net 11(3).	No	Focus not on PBE		
243	Nováková, M., et al. (2020). "Challenges for social policy and health policy in a shared economy." SHS web of conferences 74: 3007.	No	Focus not on PBE		
244	O'Sullivan, J., et al. (2020). "An Integrative Framework for Stakeholder Engagement Using the Basin Futures Platform." Water (Basel) 12(9): 2398.	No	Focus not on PBE		
245	Pacella, G. (2019). "Work through digital platform in civil law case-law." Labour & Law Issues 5(1): 15-42.	No	Focus not on PBE		
246	Parmentier, G. and R. Gandia (2017). "Redesigning the business model: from one-sided to multi-sided." Journal of Business Strategy 38(2): 52-61.	Yes		no	Focus on design issues
247	Pell, R., et al. (2019). "The use of digital pathology and image analysis in clinical trials." The journal of pathology. Clinical research 5(2): 81-90.	No	Focus not on PBE		

248	Pennefather, P., et al. (2010). "Pill characterization data streams for reducing exposure to inadequately identified anti-malarial medication in developing countries." <i>Malaria journal</i> 9(1): 214-214.	No	Focus not on PBE		
249	Peral, J., et al. (2020). "Using Visualization to Build Transparency in a Healthcare Blockchain Application." <i>Sustainability (Basel, Switzerland)</i> 12(17): 6768.	No	Focus not on PBE		
250	Peral, J., et al. (2020). "Using Visualization to Build Transparency in a Healthcare Blockchain Application." <i>Sustainability (Basel, Switzerland)</i> 12(17): 6768.	No	Duplicate		
251	Pinzon-Pulido, S., et al. (2019). "Creation Process of the Digital Platform to Foster Healthy and Active Aging: enbuenaedad." <i>Frontiers in public health</i> 7: 22-22.	Yes		no	Focus not on PBE
252	Piscicelli, L., et al. (2018). "What makes a sustainable business model successful? : An empirical comparison of two peer-to-peer goods-sharing platforms." <i>Journal of cleaner production</i> 172: 4580.	No	Focus not on PBE		
253	Piscicelli, L., et al. (2018). "What makes a sustainable business model successful? An empirical comparison of two peer-to-peer goods-sharing platforms." <i>Journal of cleaner production</i> 172: 4580-4591.	No	Duplicate		
254	Pitafi, A. H., et al. (2020). "Employee agility and enterprise social media: The Role of IT proficiency and work expertise." <i>Technology in society</i> 63: 101333.	No	Focus not on PBE		
255	Pogorelova, E. V., et al. (2019). "Modernization of Managing a "Smart City" on the Basis of Digital Platforms." <i>SHS web of conferences</i> 71: 4017.	Doubt	Vague PBE definition	No	Focus on digital platform
256	Poole, A. (2018). "Fractivism: Corporate Bodies and Chemical Bonds." <i>Conservation and Society</i> 16(4): 525-526.	No	Focus not on PBE		
257	Portuese, A. (2020). "Beyond antitrust populism: Towards robust antitrust." <i>Economic affairs (Harlow)</i> 40(2): 237-258.	No	Focus not on PBE		
258	Pulkkinen, J., et al. (2019). "Smart Mobility: Services, Platforms and Ecosystems." <i>Technology innovation management review</i> 9(9): 15-24.	No	Focus not on PBE		
259	Purdy, C. H. (2011). "Using the Internet and social media to promote condom use in Turkey." <i>Reproductive health matters</i> 19(37): 157-165.	No	Focus not on PBE		
260	Qu, L. and C. Assi (2020). "Reliability-Aware Multi-Source Multicast Hybrid Routing in Softwarized Networks." <i>IEEE access</i> 8: 113331-113341.	No	Focus not on PBE		
261	Raimondi, E. (2019). "Platform work and the qualification's problem." <i>Labour & Law Issues</i> 5(2): 57-94.	No	Focus not on PBE		
262	Rana, N. P., et al. (2019). "Key challenges to digital financial services in emerging economies: the Indian context." <i>Information technology & people (West Linn, Or.)</i> 33(1): 198-229.	No	Focus not on PBE		

263	Ricaurte-Quijano, P. and A. C. Alvarez (2016). "The Wiki Learning project: Wikipedia as an open learning environment/El proyecto Wiki Learning: Wikipedia como entorno de aprendizaje abierto." Comunicar (Huelva, Spain) 24(49): 61.	No	Focus not on PBE		
264	Ricaurte-Quijano, P. and A. Carli Alvarez (2016). "The Wiki Learning Project: Wikipedia as an Open Learning Environment." Comunicar (Huelva, Spain) 24(49): 61-69.	No	Duplicate		
265	Richmond, S., et al. (2019). "USING AN INTEGRATED KNOWLEDGE TRANSLATION APPROACH TO INFORM THE DEVELOPMENT AND EVALUATION OF ACTIVE & SAFE CENTRAL: AN ON-LINE PLATFORM OF EVIDENCE-BASED SPORT AND RECREATIONAL INJURY INFORMATION." Orthopaedic journal of sports medicine 7(3_suppl): 2325967119.	No	Focus not on PBE		
266	Riddell, J., et al. (2017). "JGME -ALiEM Hot Topics in Medical Education: Analysis of a Multimodal Online Discussion About Team-Based Learning." Journal of graduate medical education 9(1): 102-108.	No	Focus not on PBE		
267	Roche, M., et al. (2018). "From Potpourri to Percipience: Developing Problem Solving Skills in Medical Students through a Computer Assisted Active Learning Strategy." Journal of clinical and diagnostic research 12(4): JC11-JC14.	No	Focus not on PBE		
268	Rolfe, H. (2020). "Inequality, Social Mobility and the New Economy: Introduction." National Institute economic review 240(1): R1-R4.	No	Focus not on PBE		
269	Rolland, K. H., et al. (2018). "Managing Digital Platforms in User Organizations: The Interactions Between Digital Options and Digital Debt." Information Systems Research 29(2): 419-443.	Doubt	Vague PBE definition	yes	
270	Roque, R., et al. (2016). "Children's Civic Engagement in the Scratch Online Community." Social sciences (Basel) 5(4): 55.	No	Focus not on PBE		
271	Rossato, C. and P. Castellani (2020). "The contribution of digitalisation to business longevity from a competitiveness perspective." TQM journal 32(4): 617-645.	No	Focus not on PBE		
272	Roukouni, A., et al. (2020). "Let the Game Begin: Enhancing Sustainable Collaboration among Actors in Innovation Ecosystems in a Playful Way." Sustainability (Basel, Switzerland) 12(8494): 8494.	No	Focus not on PBE		
273	Royakkers, L., et al. (2018). "Societal and ethical issues of digitization." Ethics and information technology 20(2): 127-142.	No	Focus not on PBE		
274	Ruiz-Mafe, C., et al. (2020). "The effect of emotions, eWOM quality and online review sequence on consumer intention to follow advice obtained from digital services." Journal of service management 31(3): 465-487.	No	Focus not on PBE		
275	Said, O. and A. Tolba (2020). "DORS: A data overhead reduction scheme for hybrid networks in smart cities." International journal of communication systems 33(12): e4435-n/a.	No	Focus not on PBE		

276	Santos de Morales, R., et al. (2016). "Contribuições do sociointeracionismo para a aprendizagem de um idioma em plataformas digitais / Contributions from sociointeracionism to the learning of a language in digital platforms." Texto livre 9(2): 148-160.	No	Language not English		
277	Santos, Á. O. d., et al. (2019). "Desenvolvimento e Avaliação de uma Plataforma Colaborativa Digital para Educação e Tomada de Decisão Médica Baseada em Evidências." Revista brasileira de educação médica 43(1 suppl 1): 513-524.	No	Language not English		
278	Santos, Á. O. d., et al. (2019). "Development and Evaluation of a Crowdsourcing Platform for Education and Evidence-Based Medical Decision-Making." Revista brasileira de educação médica 43(1 suppl 1): 513-524.	No	Duplicate		
279	Sarkar, N. D. P., et al. (2020). "Towards a digitally-enabled, community-based responsive health system in Tanzania: a formative study for the Afya-Tek digitised health initiative." The Lancet global health 8: S35-S35.	No	Focus not on PBE		
280	Sarkhoh, N. and M. KhosraviNik (2020). "Social media discourses of Arabism and the negotiation of Self in the Middle East." World Englishes.	No	Focus not on PBE		
281	Sato, E., et al. (2017). "Integrating Digital Technology in an Intensive, Fully Online College Course for Japanese Beginning Learners: A Standards-Based, Performance-Driven Approach." The Modern language journal (Boulder, Colo.) 101(4): 756.	No	Focus not on PBE		
282	Sato, E., et al. (2017). "Integrating Digital Technology in an Intensive, Fully Online College Course for Japanese Beginning Learners: A Standards-Based, Performance-Driven Approach." The Modern language journal (Boulder, Colo.) 101(4): 756-775.	No	Duplicate		
283	Säynäjoki, A., et al. (2017). "Data Commercialisation: Extracting Value from Smart Buildings." Buildings (Basel) 7(4): 104.	No	Focus not on PBE		
284	Scarcelli, C. M., et al. (2020). "Sexuality, gender, media. Identity articulations in the contemporary media landscape INTRODUCTION." Information, communication & society.	No	Focus not on PBE		
285	Scarcelli, C. M., et al. (2020). "Sexuality, gender, media. Identity articulations in the contemporary media landscape." Information, communication & society: 1-10.	No	Duplicate		
286	Schmidt, M.-C., et al. (2019). "Kick-Start for Connectivity: How to Implement Digital Platforms Successfully in Industry 4.0." Technology innovation management review 9(10): 5-15.	Yes		no	Focus on digital platform
287	Scholten, S. and U. Scholten (2011). "Platform-based Innovation Management: Directing External Innovational Efforts in Platform Ecosystems." Journal of the knowledge economy 3(2): 164-184.	Yes		yes	
288	Schwarz, O. (2019). "Facebook Rules: Structures of Governance in Digital Capitalism and the Control of Generalized Social Capital." Theory, culture & society 36(4): 117-141.	No	Focus not on PBE		

289	Scolere, L. (2019). "Digital inspirational economy: the dialectics of design." Information, communication & society: 1-20.	No	Focus not on PBE		
290	Scott, K. R., et al. (2014). "Integration of Social Media in Emergency Medicine Residency Curriculum." Annals of emergency medicine 64(4): 396-404.	No	Focus not on PBE		
291	See, Z. S. and A. D. Cheok (2014). "Virtual reality 360 interactive panorama reproduction obstacles and issues." Virtual reality : the journal of the Virtual Reality Society 19(2): 71-81.	No	Focus not on PBE		
292	Seo, S. (2020). "'We see more because we are not there': Sourcing norms and routines in covering Iran and North Korea." New media & society 22(2): 283-299.	No	Focus not on PBE		
293	Sgarbossa, A., et al. (2015). "A multivariate SIMCA index as discriminant in wood pellet quality assessment." Renewable energy 76: 258-263.	No	Focus not on PBE		
294	Sharif, O., et al. (2020). "Detecting Suspicious Texts Using Machine Learning Techniques." Applied sciences 10(6527): 6527.	No	Focus not on PBE		
295	Sharma, A., et al. (2020). "Are small travel agencies ready for digital marketing? Views of travel agency managers." Tourism management (1982) 79: 104078.	No	Focus not on PBE		
296	Shaw, P. A., et al. (2016). "The design and conduct of Keep It Off: An online randomized trial of financial incentives for weight-loss maintenance." Clinical trials (London, England) 14(1): 29-36.	No	Focus not on PBE		
297	Shikhlyarova, A. I., et al. (2018). "Cardiometry in oncology: new digital possibilities for analyzing the cardiovascular system state in cancer patients." Cardiometry(13): 35-41.	No	Focus not on PBE		
298	Silva, S. and M. Kenney (2019) Algorithms, platforms, and ethnic bias. 62, 37-39 DOI: 10.1145/3318157	No	Focus not on PBE		
299	Simpson, A. and M. Walsh (2014). "Pedagogic conceptualisations for touch pad technologies." The Australian journal of language and literacy 37(2): 128-138.	No	Focus not on PBE		
300	Singh, G., et al. (2020). "Containing the first outbreak of COVID-19 in a healthcare setting in India: The sree chitra experience." Indian journal of public health 64(6): 240-242.	No	Focus not on PBE		
301	Snead, D. R. J., et al. (2016). "Validation of digital pathology imaging for primary histopathological diagnosis." Histopathology 68(7): 1063-1072.	No	Focus not on PBE		
302	Sobreira da Silva, M. J., et al. (2017). "Learning the art of science publishing." Cadernos de saúde pública 33(12): e00200817.	No	Focus not on PBE		
303	Sooter, L. J., et al. (2019). "Modeling a Clinical Pathway for Contraception." Applied clinical informatics 10(5): 935-943.	No	Focus not on PBE		

304	Sree Vidya, B. and E. Chandra (2019). "Entropy based Local Binary Pattern (ELBP) feature extraction technique of multimodal biometrics as defence mechanism for cloud storage." Alexandria engineering journal 58(1): 103-114.	No	Focus not on PBE		
305	Steuer, A. J. (2018). "When a New Platform Enters a Market, What Is the Impact on Incumbents?" Technology innovation management review 8(10): 44-53.	No	Focus not on PBE		
306	Sukhanov, A. V., et al. (2016). "A universal digital platform for the construction of self-organizing wireless sensor networks for industrial safety and ecological monitoring systems." Russian microelectronics 45(2): 137-141.	No	Focus not on PBE		
307	Sykes, S. and J. Wills (2019). "eHealth Literacy and Fertility – managing complex information in a digital environment." European Journal of Public Health 29(Supplement_4).	No	Focus not on PBE		
308	Tanev, S. and G. Sandstrom (2019). "Editorial: Celebrating Innovation in Florence." Technology innovation management review 9(10): 3-4.	No	Abstract missing		
309	Tanev, S. and G. Sandstrom (2020). "Editorial: Insights." Technology innovation management review 10(7): 3-3.	No	Duplicate		
310	Tinsley, M. and R. Verma (2019). "Electronic, Real-Time use of Patient Reported Measures to improve health outcomes, experiences and drive system transformation." International journal of integrated care 19(4): 442.	No	Focus not on PBE		
311	Tissenbaum, M., et al. (2012). "Co-Designing Collaborative Smart Classroom Curriculum for Secondary School Science." J.UCS (Annual print and CD-ROM archive ed.) 18(3): 327-352.	No	Focus not on PBE		
312	Tomlinson, E. and S. Newman (2018). "Epideictic Rhetoric Born Digital: Evolution of the Letter of Recommendation Genre." Journal of business and technical communication 32(1): 3-37.	No	Focus not on PBE		
313	Torres, J. (2020). "Heritage language learners' written texts across pair types and interaction mode." Language teaching research : LTR: 136216882093318.	No	Focus not on PBE		
314	Tsai, C.-L. (2018). "The timing of fostering complementary innovation: exploring the antecedent of industry platform emergence." Technology analysis & strategic management 30(10): 1121-1135.	Yes		No	Focus on digital platform
315	Tullini, P. (2016). "Digital economy and non-standard work." Labour & Law Issues 2(2): 1-15.	No	Focus not on PBE		
316	Usiskin, Z. (2018). "Electronic vs. paper textbook presentations of the various aspects of mathematics." ZDM : The International Journal on Mathematics Education 50(5): 849-861.	No	Focus not on PBE		
317	van Angeren, J., et al. (2016). "Can We Ask You To Collaborate? Analyzing App Developer Relationships in Commercial Platform Ecosystems." The Journal of systems and software 113(March): 430.	No	Duplicate		

318	van Angeren, J., et al. (2016). "Can we ask you to collaborate? Analyzing app developer relationships in commercial platform ecosystems." The Journal of systems and software 113: 430-445.	Yes		yes	
319	van Dijck, J., et al. (2019). "Reframing platform power." Internet policy review 8(2).	No	Duplicate		
320	Van Dijck, J., et al. (2019). "Reframing platform power." Internet policy review 8(2): 1.	Yes		yes	
321	Van Dijck, J., et al. (2019). "Reframing platform power." Internet policy review 8(2): 1.	No	Duplicate		
322	van Doorn, N. (2017). "Platform labor: on the gendered and racialized exploitation of low-income service work in the 'on-demand' economy." Information, communication & society 20(6): 898-914.	No	Focus not on PBE		
323	Van Etten, J., et al. (2016). "FIRST EXPERIENCES WITH A NOVEL FARMER CITIZEN SCIENCE APPROACH: CROWDSOURCING PARTICIPATORY VARIETY SELECTION THROUGH ON-FARM TRIADIC COMPARISONS OF TECHNOLOGIES (TRICOT)." Experimental agriculture 55(S1): 275-296.	No	Focus not on PBE		
324	Van Etten, J., et al. (2016). "FIRST EXPERIENCES WITH A NOVEL FARMER CITIZEN SCIENCE APPROACH: CROWDSOURCING PARTICIPATORY VARIETY SELECTION THROUGH ON-FARM TRIADIC COMPARISONS OF TECHNOLOGIES (TRICOT)." Experimental agriculture 55(S1): 275-296.	No	Duplicate		
325	Van Miegroet, H. J., et al. (2019). "Imperfect Data, Art Markets and Internet Research." Arts (Basel) 8(3): 76.	No	Focus not on PBE		
326	Van Rensburg, N. J., et al. (2019). "Society 4.0 applied in Africa: Advancing the social impact of technology." Technology in society 59: 101125.	No	Focus not on PBE		
327	van Zyl, L. E., et al. (2020). "Exploring meaning in life through a brief photo-ethnographic intervention using Instagram: a Bayesian growth modelling approach." International review of psychiatry (Abingdon, England): 1-23.	No	Focus not on PBE		
328	Vasquez-Chavesta, A. Z., et al. (2020). "COVID-19 and dengue: Pushing the peruvian health care system over the edge." Travel medicine and infectious disease 36: 101808-101808.	No	Focus not on PBE		
329	Veisdal, J. (2020). "The dynamics of entry for digital platforms in two-sided markets: a multi-case study." Electronic Markets.	Yes		yes	
330	Vieira, J. M. and R. S. Camacho (2020). "Countryside Education in the interface with Special Education at basic and superior levels in the municipality of Dourados - MS." Revista Brasileira de Educação do Campo 5: 1-32.	No	Focus not on PBE		
331	Villalobos, N., et al. (2020). "Digital Healthcare Intervention to Improve Self-Management for Patients with Type 2 Diabetes: A Scoping Review." Journal of scientific innovation in medicine 3(3).	No	Focus not on PBE		
332	Visconti, R. M. and D. Morea (2020). "Healthcare Digitalization and Pay-For-Performance Incentives in Smart Hospital Project Financing." International journal of environmental research and public health 17(7): 2318.	Yes		no	Focus on healthcare

333	Wang, F., et al. (2017). "Collaborative innovation capability in IT-enabled inter-firm collaboration." <i>Industrial management + data systems</i> 117(10): 2364-2380.	No	Focus not on PBE		
334	Watanabe, C., et al. (2018). "Digital solutions transform the forest-based bioeconomy into a digital platform industry - A suggestion for a disruptive business model in the digital economy." <i>Technology in society</i> 54: 168-188.	No	Focus not on PBE		
335	Wei, J. M. (2020). "Naming candidates as preemptive discursive practice: The 2016 Taiwan presidential race." <i>Journal of pragmatics</i> 166: 84-96.	No	Focus not on PBE		
336	Wei, R., et al. (2019). "A platform approach in solution business: How platform openness can be used to control solution networks." <i>Industrial Marketing Management</i> 83: 251-265.	Yes		no	Focus on digital platform
337	Wentrup, R., et al. (2019). "Uberization in Paris – the issue of trust between a digital platform and digital workers." <i>Critical perspectives on international business</i> 15(1): 20-41.	Yes		no	Focus on digital work
338	Wolfond, G. (2017). "A Blockchain Ecosystem for Digital Identity: Improving Service Delivery in Canada's Public and Private Sectors." <i>Technology innovation management review</i> 7(10): 35-40.	No	Focus not on PBE		
339	Yaqub, M. Z., et al. (2020). "Network innovation versus innovation through networks." <i>Industrial Marketing Management</i> 90: 79-89.	No	Focus not on PBE		
340	Yi, J., et al. (2019). "Platform heterogeneity, platform governance and complementors' product performance: an empirical study of the mobile application industry." <i>Frontiers of business research in China</i> 13(1): 1-20.	Yes		yes	
341	Young, J. C. (2019). "Rural digital geographies and new landscapes of social resilience." <i>Journal of rural studies</i> 70: 66-74.	No	Focus not on PBE		
342	Yun, J. J., et al. (2017). "Evolution and variety in complex geographies and enterprise policies." <i>European planning studies</i> 25(5): 729-738.	No	Focus not on PBE		
343	Zaslavska, O. I. and U. Uzhhorod National (2020). "Virtual Banking: Challenges and Prospects." <i>Biznes inform (Multilingual ed.)</i> 4(507): 350-356.	No	Focus not on PBE		
344	Zummo, L., et al. (2020). "Youth voice on climate change: using factor analysis to understand the intersection of science, politics, and emotion." <i>Environmental education research</i> 26(8): 1207-1226.	No	Focus not on PBE		
345	Zysman, J. and M. Kenney (2018) The next phase in the digital revolution: intelligent tools, platforms, growth, employment. 61, 54-63 DOI: 10.1145/3173550	Yes		no	Focus on governance of technology development

Appendix 2: SLR Quality assessment

Quality assessment of selected studies.

Article Nr.	Author	Study design	Research question/aim	Key findings	How defensible is the research design?	How well was data collection carried out?	How clear are the links between data, interpretation and conclusions	How adequately has the research process been documented?
A8	Hildebrandt, B., et al. (2018). "Sharing Yet Caring." Business & Information Systems Engineering 60(3): 227-241.	quasi - experimental research design, situated in a carsharing context	With our study, we contribute to the emerging literature on the economics of digital business ecosystems and provide a perspective relevant to increasing the sustainability of such service business models with widespread and transformational impacts on the landscapes of cities	We contend that by separating ownership from use, ABC business models are susceptible to several obstacles to the enduringly profitable large-scale provision of these services and the associated environmental and societal gains	Well defensible, makes sense	Well	well described	well described
A17	Müller, J. M. (2019). "Antecedents to Digital Platform Usage in Industry 4.0 by Established Manufacturers."	qualitative-exploratory study	RQ 1: What are the underlying challenges that impede the unfolding of digital platforms in an industrial context? RQ 2: Which are the potentials that can be achieved through the usage of digital platforms in an industrial context?	In particular, the paper finds that platform-based business models, approaches to open innovation, and new forms of value creation are not yet understood entirely by industrial manufacturers	Well described, makes sense	well	well described	well described

	Sustainability (Basel, Switzerland) 11(4): 1121.		RQ 3: How do challenges and potentials of digital platforms in an industrial context differ among industry sectors?					
A21	Van Dijck, J., et al. (2019). "Reframing platform power." Internet policy review 8(2): 1.	conceptual study	This article addresses the problem of platform power by probing current regulatory frameworks' basic assumptions about how tech firms operate in digital ecosystems	INTEGRATED ECOSYSTEMS REQUIRE INTEGRATED POLICY AND REGULATION	conceptual study	NA	well argued	NA
A24	Geneviève, L. D., et al. (2019). "Participatory Disease Surveillance Systems: Ethical Framework." Journal of medical Internet research 21(5): e12273-e12273.	Qualitative case study	However, a 2017 systematic review on ethical issues of public health surveillance revealed that there is a need for more context-specific analyses to guide public health practice [5]. Consequently, providing an ethical framework for the regulation of such innovative participatory surveillance methods, using a real-world example, becomes of utmost importance.	1 of the key ethical safeguards proposed in our framework is a properly implemented e-consent.	case study, seems appropriate	moderate	moderate	moderate
A4	Hazée, S., et al. (2020). "Why customers and peer service providers do not participate in collaborative consumption." Journal of service management 31(3): 397-419.	mixed-method qualitative approach, all data were analysed using a thematic analytic approach.	many digital platform providers still fail to build a critical mass of demand and supply. Accordingly, the aim of this research is to develop a better understanding of the barriers perceived by both customers and peer service providers	actors may perceive barriers related to complexity, value, risk, compatibility, contamination, image, and responsibility, which prevent them from participating in collaborative consumption	Well described, seems to make sense	Exploratory: interviews	Good	well

A5	Hein, A., et al. (2019). "Digital platform ecosystems." Electronic Markets 30(1): 87-98.	literature synthesis	This Fundamentals article synthesizes the literature of digital platforms and ecosystems in combination with contemporary examples of digital platform ecosystems to develop a novel research model.	Based on this synthesis, we suggest that three attributes are essential when discussing the different variants of digital platform ecosystems: (1) platform ownership, (2) value-creating mechanisms, and (3) the autonomy of complementors.	literature synthesis	not described	not described	not described
A13	Kim, J. (2018). "Market entry strategy for a digital platform provider." Baltic journal of management 13(3): 390-406.	Single case study	How can a digital platform provider successfully secure users in its early stage to build an ecosystem? The purpose of this paper is to explore this issue through a case study	The study identifies two important early stage characteristics for a business platform to be successful: the core users' activities on the platform are a critical element for the network's expansion and usage, and user relationships are more important than user contents on the digital platform.	Well described, makes sense	Well	well described	well described
A22	Veisdal, J. (2020). "The dynamics of entry for digital platforms in two-sided markets: a multi-case study." Electronic Markets.	multiple case study	This paper examines the phenomenon of supplier recruitment to platforms in two-sided digital markets prior to their establishment of network effects.	Findings from ten established two-sided platform firms in Norway suggest that the viability of nascent platform firms' entry strategies is reliant on both organizational and contextual factors, whose details vary on case-by-case bases, but whose underlying managerial considerations have much in common.	Well described, makes sense	well	well	well described
A14	Korhonen, H., et al. (2017). "The Core Interaction of Platforms: How Startups Connect Users and Producers." Technology	multiple case study	The Core Interaction of Platforms: How Startups Connect Users and Producers		Well described, makes sense	Well	well described	well described

	innovation management review 7(9): 17-29.							
A18	Rolland, K. H., et al. (2018). "Managing Digital Platforms in User Organizations: The Interactions Between Digital Options and Digital Debt." Information Systems Research 29(2): 419-443.	Single case study	How are digital options and digital debt implicated over time in an organization's management of a digital platform in relation to the organization's digital infrastructure?	An organization will more likely benefit from and sustain its digital platform if it mindfully leverages the generativity that the organization's digital infrastructure and the platform ecosystem afford by iteratively developing and realizing digital options as integral parts of its organizational and technological context. To be effective, this process must include leveraging related digital resources from the digital infrastructure and engaging competencies of actors in the platform ecosystem.	Well described, makes sense	well	well described	well described
A9	Kabakova, O., et al. (2016). "Strategizing for Financial Technology Platforms: Findings from Four Russian Case Studies." Psychology & marketing 33(12): 1106-1111.	Qualitative multiple case study	For the sake of business strategy, the difference that is made by the "platform–ecosystem" model comes from the fact that a large part—sometimes even most—of the resulting benefits of the customers are provided, not by the owners of the platform, but by independent third parties (Baghbadorani & Harandi, 2012; Makinen & Dedehayir, 2012). Obviously, this should influence the decision-making processes in the companies that create and operate the digital platforms. The present	Three key notions that define the strategic paradigm of the developers of the digital financial platforms were discovered within the scope of this study. These notions are as follows: inclusion, market dynamism, and reliance on independent participants of ecosystem.	Partly, research design was not much elaborated	moderate	moderate	moderate

			article is focused on finding the differences in this process compared to the traditional business strategy					
A16	Mukerji, M. and P. S. Roy (2019). "Platform Interactions and Emergence of an Organizational Field: Case Study on Ola." AJIS. Australasian journal of information systems 23.	Single case study	In this paper we use institutional theory as a lens to argue that digital platforms in India constitute an emerging organizational field, shaped by network logics and interactions between various constituents.	Technological advancements and innovations often create new organizational fields	Well described, makes sense	moderate	well described	well described
A6	Hevner, A. and O. Malgonde (2019). "Effectual application development on digital platforms." Electronic Markets 29(3): 407-421.	A qualitative data analysis of opensource application development projects.	We argue that these desired properties support a new vision of the software development team as entrepreneurs. qualitative study of opensource application development projects.	The preliminary findings provide support for the promise of effectual development methods.	Qualitative data analysis	moderate	well described	well described
A15	Miric, M. and L. B. Jeppesen (2020). "Does piracy lead to product abandonment or stimulate new product development? Evidence from	Single case study	Understanding the implications of these piracy violations informs the broader literature on imitation, which has sought to "understand why imitation occurs and when it may have harmful implications	This does provide support for H3, suggesting that piracy does lead to a decline of minor bug fixes, but an increase (or less of a decrease) of major updates such as feature updates.	Well described, makes sense	Well	well described	well described

	mobile platform-based developer firms." Strategic management journal.							
A1	de Reuver, G. A., et al. (2020). "Digital platforms and responsible innovation: expanding value sensitive design to overcome ontological uncertainty." Ethics and information technology 22(3): 257-267.	Conceptual study	this paper explores how VSD methods can be expanded to be suitable for digital platforms. Specifically, we suggest expansions to VSD methods to address the ontological uncertainty in value implications of digital platforms		Conceptual study	NA	Argumentation for conclusions and model is provided	NA
A3	Han, Y. (2020). "A Tripartite Evolutionary Game Analysis of Enterprises' Behaviour in the Platform Ecosystem." Discrete dynamics in nature and society 2020: 1-10.	Conceptual study	This paper aims to explore platform governance's effects on enterprises' behaviour in a multiorganizational platform ecosystem context.	It was discovered that both formal and informal governance can decrease internal enterprises' opportunistic behaviours. Furthermore, formal governance has stronger effects than informal governance, although informal governance's effects are more stable	Conceptual study	NA	Seems to be described well	NA
A7	Hilbolling, S., et al. (2019). "Complementors as connectors:	mixed method in-depth field study	How do platform owners manage open innovation to coordinate the development of diverse	our findings show that external actors develop increasingly complex connections to a platform. these increasingly complex connections	Well defensible,	Well	well described	well described

	managing open innovation around digital product platforms." R & D management 50(1): 18-30.		complementary products on their digital platform?	with complements extend beyond what was intended and foreseen by focal platform owners. Our study finds that connections created by complementors can span multiple platforms, leading to an ecology of platforms	makes sense			
A23	Yi, J., et al. (2019). "Platform heterogeneity, platform governance and complementors' product performance: an empirical study of the mobile application industry." Frontiers of business research in China 13(1): 1-20.	theoretical model	this paper intends to empirically investigate the impact of platform governance on the product performance of complementors in the mobile application industry, based on firstly released apps on Apple's App Store and Google Play	Our study shows that complementors of free mobile applications on the weakly regulated platform, Google Play, perform much better than those on the strictly regulated platform, Apple's App Store, due to the larger size of the installed base. However, complementors on the strictly regulated platform, Apple's App Store, can take advantage of highly valued end-users on the demand side and higher degrees of product differentiation on the supply side to enhance their product performance.	moderately well described, seems to make sense	Moderate	moderate	moderate
A12	Khuntia, J., et al. (2017). "How Service Offerings and Operational Maturity Influence the Viability of Health Information Exchanges." Production and operations	multiple case study	We pose the following research question: How does the evolution of service offerings and the revenue model influence the operational maturity and financial viability of HIEs?	We find that the age of the HIE positively moderates the influence of number of service offerings on operational maturity; but has a negative moderation effect on financial viability.	Well described, makes sense	Well	well described	well described

	management 26(11): 1989-2005.							
A20	van Angeren, J., et al. (2016). "Can we ask you to collaborate? Analysing app developer relationships in commercial platform ecosystems." The Journal of systems and software 113: 430-445.	exploratory case study	What are the characteristics of interfirm relationships in commercial platform ecosystems? 2. How do governance mechanisms such as entry barriers to the app store, partnership models, and the domain of the underpinning software platform affect the initiation of interfirm relationships among app developers in commercial platform ecosystems?	Our study has shown that there is substantial variety in the network structure of commercial platform ecosystems. Although the overall network density of commercial platform ecosystems was found to be low, we illustrated that app developers actively collaborate and co-create through interfirm relationships such as technological partnerships and mutual product certification. We also found that the entry barriers to the app store, partnership models, and the domain of the underpinning software platform respectively affect the number of app developers in, and network density of, commercial platform ecosystems.	Well described, makes sense	well	well	well described
A19	Scholten, S. and U. Scholten (2011). "Platform-based Innovation Management: Directing External Innovational Efforts in Platform Ecosystems." Journal of the knowledge	Qualitative case and exploratory study	In this paper, we aim at closing this gap by identifying and categorizing control mechanisms leading platform owners in the ICT industry have implemented to steer external complementary innovation efforts on top of their platform.	Within this context, we show that leading platform owners have put a strong focus on attracting and tying external complementors to their platforms. They apply several distinct types of control mechanisms along their external innovation process, including (a) market regulative control, (b) co-regulative control, (c) restrictive control, (d) sanctional control, (e) motivational control and (f) informative control.	moderately well described, seems to make sense	Moderate	moderate	moderate

	economy 3(2): 164-184.							
A2	Garud, R., et al. (2020). "Liminal movement by digital platform-based sharing economy ventures: The case of Uber Technologies." Strategic management journal.	Qualitative case study	By introducing the concept of liminal movement, our study offers new insights into this conversation	As we found, cognitive and socio-political legitimacies are gained, lost, and traded off in fits and starts over time. The central contribution of our study is our process model of liminal movement, which was made possible by adopting a sociological perspective on platforms and ecosystems. Our process model applies to sharing economy ventures that (a) are based on digital platforms, subject to network effects, and need to mobilize physical assets to support their business models, (b) confront multiple local contexts, each with its own set of regulators and regulations that are mismatched with their novel business models, and (c) engage in permission less entry (or some variant of it). A key insight from our study is that platform-based sharing economy ventures must enter despite the potential to contravene existing regulations to increase the visibility of their services and business models to market actors.	Well described, seems to make sense	Data is described.	Good	Well, in appendix

A11	Khanagha, S., et al. (2020). "Mutualism and the dynamics of new platform creation: A study of cisco and fog computing." Strategic management journal.	Qualitative case study	In this paper, we study how an incumbent firm in networking, Cisco, attempted to reconcile these risks when formulating its platform strategy. Our interest in how incumbents respond to a dominant platform emerged inductively during research on the rise of Cloud computing.	Our inductive study of platform creation strategy at Cisco reveals that this process can be divided into two phases: seeding and building initial momentum for the platform and scaling the platform	Well described, makes sense	Well	well described	well described
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Appendix 3: SLR Coding and data extraction

Data extraction table and coding: open codes, sub-categories and categories.

Article Nr.	Open Coding	Sub-category	Category	Identified challenges and context	Author
1	Degree of control	Control	Ecosystem Governance	2. platform providers face challenges in exercising control. First, tight control can have negative implications on the viability of a platform. The degree to which control is exerted may negatively affect motivations of app developers to contribute to a platform (Goldbach et al. 2014; Schaarschmidt et al. 2018). In fact, giving up control makes it more likely for a platform provider to attract users and developers, and hence survive on the market (Ondrus et al. 2015).	de Reuver, G. A., et al. (2020). "Digital platforms and responsible innovation: expanding value sensitive design to overcome ontological uncertainty." Ethics and information technology 22(3): 257-267.
1	Control efficiency	Control	Ecosystem Governance	3. Second, platform providers struggle to exercise control effectively. An extensive case study on the Apple iOS platform showed that control over boundary resources is continuously contested by third parties, for instance by pressuring the platform owner to open up its APIs (Eaton et al. 2015).	de Reuver, G. A., et al. (2020). "Digital platforms and responsible innovation: expanding value sensitive design to overcome ontological uncertainty." Ethics and information technology 22(3): 257-267.
1	Control design	Control	Ecosystem Governance	4. Third, platform providers face time pressure to launch platforms on the market, which prevents them from contemplating control mechanisms extensively. The pressure to launch new platforms quickly is growing as large providers are 'enveloping' their existing platforms into new markets (see e.g., Amazon and Apple) (Eisenmann et al. 2011)	de Reuver, G. A., et al. (2020). "Digital platforms and responsible innovation: expanding value sensitive design to overcome ontological uncertainty." Ethics and information technology 22(3): 257-267.

1	Undesirable usage or add-ons	Control	Ecosystem Governance	1. there is a wealth of literature available exploring measures of control and governance to prevent the undesirable usage or add-ons (e.g. Wareham et al 5. Accordingly, continual iterations whereby values are a central feature in the acceptability of the platform (as opposed to functionality exclusively) enable the platform designers (and others) to identify ethical, and sometimes legal, issues and values that were not foreseen at the design stage, and to take additional measures to address these properly.	de Reuver, G. A., et al. (2020). "Digital platforms and responsible innovation: expanding value sensitive design to overcome ontological uncertainty." <i>Ethics and information technology</i> 22(3): 257-267.
2	Chicken and egg problem	Platform startup phenomena	PBE Phenomena	2. Entrepreneurs also face the problem of generating same-side and cross-side (or indirect) network effects (described as a "chicken and egg" problem in Caillaud & Jullien, 2003) in the case of platform-based business models (Helfat & Raubitschek, 2018). 4. The challenges involved in jump-starting network effects within and across sides have been labeled the "chicken and egg" problem (Caillaud & Jullien, 2003).	Garud, R., et al. (2020). "Liminal movement by digital platform-based sharing economy ventures: The case of Uber Technologies." <i>Strategic management journal</i> .
2	Local Network effects	Platform properties	PBE Phenomena	3. An additional challenge that entrepreneurs confront in introducing sharing economy business models is that these models are driven by "local network effects" (Sundararajan, 2016). As a result, ventures encounter scale-up challenges within each and every local context they enter (see also Grajek & Kretschmer, 2012, for related arguments on the dynamics of critical mass generation being a "local rather than a global phenomenon"). 9. Sundararajan (2016) moreover argued that network effects for platform-based sharing economy business models are localized. For instance, most Uber riders only care about the availability and quality of service in their own cities. Consequently, as with sociopolitical legitimacy challenges, cognitive legitimacy challenges for sharing economy ventures too will be localized. This means that a venture will have to enter each local context anew, and will have to contextualize their efforts within each setting (Garud, Gehman, & Giuliani, 2014)	Garud, R., et al. (2020). "Liminal movement by digital platform-based sharing economy ventures: The case of Uber Technologies." <i>Strategic management journal</i> .
2	Negative network effects	Platform properties	PBE Phenomena	5. Negative same-side effects refer to a decrease in the value to actors on one side when the number of actors on that side increases, due to crowding for example (Marwell & Oliver, 1993; Schelling, 1960). Likewise, negative cross-side network effects refer to a decrease in the value of the platform to actors	Garud, R., et al. (2020). "Liminal movement by digital platform-based sharing economy ventures: The case of Uber

				on one side due to the number and quality of actors on the other sides (Helfat & Raubitschek, 2018). For instance, too many or low-quality restaurants on OpenTable (a platform connecting restaurants with diners) can degrade the value of the platform for diners (Helfat & Raubitschek, 2018).	Technologies." Strategic management journal.
2	Network effects	Platform properties	PBE Phenomena	12. Uber confronted a key challenge on entering all four cities: a lack of drivers to provide the rapid service and quality experience that it promised. Without an adequate supply of drivers and their vehicles, riders would not find the company's app-based service to be valuable. Conversely, without an adequate number of riders seeking transportation through Uber's app, drivers would not sign up to offer rides. ⁶ This dynamic made it difficult for Uber to jump-start a network of drivers and riders around its ridesharing digital platform.	Garud, R., et al. (2020). "Liminal movement by digital platform-based sharing economy ventures: The case of Uber Technologies." Strategic management journal.
2	Cognitive legitimacy	Legitimacy	PBE Phenomena	6. One is cognitive legitimacy, which refers to "the spread of knowledge about a new venture" (Aldrich & Fiol, 1994, p. 648). In this regard, Aldrich and Fiol (1994) argued that ventures based on novel business models lack cognitive legitimacy, and so are unable to attract resources (see also Lounsbury & Glynn, 2001; Zimmerman & Zeitz, 2002). The lack of cognitive legitimacy is particularly problematic for platform-based business models because they will find it more difficult to address the chicken and egg problem that we introduced earlier.	Garud, R., et al. (2020). "Liminal movement by digital platform-based sharing economy ventures: The case of Uber Technologies." Strategic management journal.
2	Sociopolitical legitimacy	Legitimacy	PBE Phenomena	7. Such institutional actors include regulators, who develop regulations to address negative externalities due to market transactions (Coase, 1960). Regulations enacted to address negative externalities arising from traditional business models, however, may be inadequate or inappropriate to address the concerns and externalities that emerge due to the deployment of novel digital-platform-based business models. Consequently, the application of existing regulations to govern such novel business models may lead to mismatches between the two. Because of these mismatches, regulators and society at large will perceive ventures offering novel digital-platform-based business models as lacking legitimacy. 8. While most digital platforms must address legitimacy challenges on (and subsequent to) entry, additional complications arise for sharing economy digital platforms (Mair & Reischauer, 2017). Unlike digital platforms like Facebook which conduct their primary business online, sharing economy digital platforms may facilitate the deployment of private assets over public	Garud, R., et al. (2020). "Liminal movement by digital platform-based sharing economy ventures: The case of Uber Technologies." Strategic management journal.

				<p>infrastructure. Consequently, regulators are likely to insist that these platform-based sharing economy business models conform to regulations that apply to traditional business models that provide these same services through different means (Sundararajan, 2016, p. 114). As a result, instead of encountering institutional voids (Khanna & Palepu, 2000; Uzunca, Rigtering, & Ozcan, 2018), platform-based sharing economy business models encounter thickets of overlapping regulations that span multiple levels and jurisdictions and are not necessarily tailored to the sharing economy. This further exacerbates the problems that mismatches generate.</p> <p>11. These functionalities did not fit in neatly with existing regulations governing taxicab and PHV services, which respectively fell under the jurisdictions of the municipal-level San Francisco Municipal Transportation Authority (SFMTA) and the state-level California Public Utilities Commission (CPUC). On one hand, UberCab was offering transportation booked in advance, which aligned with CPUC's regulatory category of PHV services. On the other hand, the company was offering instantly-hailed rides, which aligned with SFMTA's regulatory category of taxicab service. In short, the company's service and business models that fell between existing services and the corresponding regulations governing them.</p> <p>13. Ironically, initial efforts by the venture in the market domain to gain cognitive legitimacy and generate network effects deepen its sociopolitical legitimacy deficit</p>	
2	Lack of legitimacy	Legitimacy	PBE Phenomena	<p>10. The challenge for platform ventures is to address the lack of cognitive legitimacy among market actors while simultaneously addressing the lack of sociopolitical legitimacy among regulators</p>	Garud, R., et al. (2020). "Liminal movement by digital platform-based sharing economy ventures: The case of Uber Technologies." Strategic management journal.
2	Resistance from members	Competitive thinking	Competition	<p>1. As scholars have noted, entrepreneurs will encounter resistance from existing ecosystem members in their efforts to develop cospecialized assets (Adner, 2012; Ansari, Garud, & Kumaraswamy, 2016; Kapoor & Lee, 2013; Teece, 1986).</p>	Garud, R., et al. (2020). "Liminal movement by digital platform-based sharing economy ventures: The case of Uber

					Technologies." Strategic management journal.
3	Control efficiency	Control	Ecosystem Governance	2. In the platform ecosystem, complementors are not constrained by platform organization [35, 40]. therefore, due to the lack of contracts or hierarchical relationships, it is difficult for platform organizations to control their internal entities	Han, Y. (2020). "A Tripartite Evolutionary Game Analysis of Enterprises' Behaviour in the Platform Ecosystem." Discrete dynamics in nature and society 2020: 1-10.
3	Realisation of effective governance	Effectiveness of governance	Ecosystem Governance	1. Consequently, an important issue in platform ecosystems involves the realisation of effective platform governance. 3. Additionally, an ecosystem may include many complementors, which requires more cost-effective governance mechanisms [41], such as government regulations, market or intellectual property contracts, and other legally binding agreements. 4. For example, one important issue involves effective platform governance to guide the platform's enterprises to develop well.	Han, Y. (2020). "A Tripartite Evolutionary Game Analysis of Enterprises' Behaviour in the Platform Ecosystem." Discrete dynamics in nature and society 2020: 1-10.
4	Functional - Complexity barrier	Innovation acceptance	PBE Innovation	5. 5.1.1 Complexity barrier. Prior innovation research has long investigated the complexity barrier (Talke and Heidenreich, 2014) and broadly conceptualized it as the difficulty associated with understanding and using the (product) innovation (Kleijnen et al., 2009). In collaborative consumption, the complexity barrier not only refers to the perceived difficulty associated with the understanding and usage of the innovation but also with its accessibility and the organization of the transaction. In line with prior research on access-based services (e.g., Hazee et al., 2017), customers consider collaborative consumption to be complex because these services are difficult to access, understand, use, and it is difficult to make transactions. For instance, customers perceive difficulties in getting access to the shared asset (e.g., apartment), which requires them to coorganize (with the peer service provider) the service delivery and carefully check the state of the shared asset	Hazée, S., et al. (2020). "Why customers and peer service providers do not participate in collaborative consumption." Journal of service management 31(3): 397-419.
4	Functional - Value barrier	PBE/product innovation	PBE Innovation	6. 5.1.2 Value barrier. In line with prior research on (product) innovation diffusion (e.g. Talke and Heidenreich, 2014), the value barrier in collaborative consumption refers to the lack of economic benefits (value for money) or relative advantage over alternatives. Both customers and peer service	Hazée, S., et al. (2020). "Why customers and peer service providers do not participate in collaborative consumption."

				<p>providers indeed question the superiority of collaborative consumption in general and of specific platforms in particular, compared to ownership and/or other services. For instance, actors may reject collaborative consumption because they worry about the size of the platform's network in terms of demand and/or supply, which is commonly considered a strong competitive advantage for companies operating in two-sided markets (also referred to as the "network effect"; Eisenmann et al., 2006). Disaggregating the value barrier with regard to the contextual issues that might arise reveals that customers are concerned about the high commission charged by platform providers, which lowers the users' economic benefits, as well as about the poor-quality of customer support. Peer service providers also question the economic value of collaborative consumption given the difficulties in predicting future financial earnings. Altogether, these value-related aspects are likely to explain why actors reject collaborative consumption</p>	<p>Journal of service management 31(3): 397-419.</p>
4	Lack of adoption	Platform startup phenomena	PBE Phenomena	<p>1. Despite the promising prospects of collaborative consumption, many organizations have failed to build a critical mass of supply and demand for their digital service (Andreassen et al., 2018; Täuscher and Kietzmann, 2017). 2. The lack of adoption of collaborative consumption by both customers and peer service providers highlights the need to understand the diffusion of collaborative consumption.</p>	<p>Hazée, S., et al. (2020). "Why customers and peer service providers do not participate in collaborative consumption." Journal of service management 31(3): 397-419.</p>
4	Actors (do not) participate in collaborative consumption	Collaborative Consumption	Specifics of business model	<p>3. While these studies individually and collectively generate relevant insights for researchers and practitioners, at least two issues remain unresolved. First, despite the importance of understanding the reasons why customers engage in collaborative consumption, understanding the reasons why actors do not adopt collaborative consumption is equally important. 4. However, when using collaborative consumption, peer service providers provide unknown customers access to their own personal assets, facing the risk that customers might damage the assets, be opportunistic, or misbehave in general (Andreassen et al., 2018). Hence, peer service providers might also face several reasons not to engage in the collaborative economy that may detrimentally affect the growth of such digital services and therefore need to be understood in more detail.</p>	<p>Hazée, S., et al. (2020). "Why customers and peer service providers do not participate in collaborative consumption." Journal of service management 31(3): 397-419.</p>

4	Psychological - Contamination barrier	Collaborative Consumption	Specifics of business model	<p>10. Contamination barrier. Similar to prior research on access-based services (e.g. Hazee et al., 2017,2019) and second-hand products (e.g. Kapitan and Bhargave, 2013), the data show that customers and peer service providers may also experience contamination concerns about the assets being shared in collaborative consumption because these assets have (or are likely to) come in physical contacts with previous customers and/or the peer service provider who owns the assets. Put differently, contamination arises when an individual believes that the asset of interest has been touched by someone else, which can create feelings of disgust as well as fear of being contaminated (Argo et al., 2006). Although assets (e.g. room) being shared via collaborative consumption are likely to be touched by a lower number of persons compared to traditional companies (e.g. hotels), the contamination barrier seems to be salient for both customers and peer service providers because actors do not know how the shared assets were used before or whether the assets were cleaned properly between each usage.</p> <p>Moreover, when using collaborative consumption, actors have the feeling of entering someone else's personal sphere (or letting someone enter one's sphere, depending on the perspective), which may trigger repulsion and explain why contamination is more important in collaborative consumption compared with traditional, employee-based business models (Morales et al., 2018). The data further suggest that the contamination barrier would be particularly salient when actors have feelings toward an object, that is, psychological ownership (Bagga et al., 2019)</p>	Hazée, S., et al. (2020). "Why customers and peer service providers do not participate in collaborative consumption." <i>Journal of service management</i> 31(3): 397-419.
4	Psychological - Image barrier	Collaborative Consumption	Specifics of business model	<p>11. Image barrier. This barrier refers to unfavourable associations regarding the platform provider's brand, the innovation category, and one's own brand. Given the triadic nature of collaborative consumption, which heavily relies on reputation systems (Andreassen et al., 2018), actors are not only concerned about the firm brand (i.e. the platform provider) and the innovation category but also about their own personal brand. Customers as well as peer service providers are indeed likely to be evaluated and rated by their counterparts. Accordingly, actors worry about the qualities (or lack thereof) that other customers or peer service providers might associate with them, as their own image or reputation will be taken into consideration in subsequent service</p>	Hazée, S., et al. (2020). "Why customers and peer service providers do not participate in collaborative consumption." <i>Journal of service management</i> 31(3): 397-419.

				requests and offers. This “reputation economy”, as called by one respondent, would place actors under pressure and accordingly create resistance	
4	Psychological - Responsibility barrier	Collaborative Consumption	Specifics of business model	<p>12. Responsibility barrier. The responsibility barrier refers to actors’ concerns about being held responsible for their own or other actors’ usage of the innovation or of the shared assets. Claudy et al.(2015)consider liability following an accident as a customer-perceived barrier to access-based services such as car-sharing. In a similar vein, customers may reject collaborative consumption because they worry about being held responsible for their own usage of the shared objects or spaces</p> <p>13. In addition, actors may also worry about their responsibility for others’ usage of the shared assets. Hazee et al.(2017)show that customers of access-based services are concerned about being held responsible for other customers’ usage of the goods (e.g. car, bike, toys). Given the triadic nature of collaborative consumption, this study extends prior conceptualization of the responsibility barrier and proposes that customers not only fear of being held responsible for previous customers’ usage of the shared assets but also for the peer service provider’s behaviour. Similarly, the responsibility barrier may explain why peer service providers reject collaborative consumption, as they are concerned about their liability in case of customer misfortune (e.g. accident during service delivery) or misbehaviour (e.g. shared assets damaged by customers).</p>	Hazée, S., et al. (2020). "Why customers and peer service providers do not participate in collaborative consumption." Journal of service management 31(3): 397-419.
4	Functional - Risk barrier	Ecosystem relations	Ecosystem Governance	<p>7. Risk barrier. The risk barrier in collaborative consumption refers to actors’ uncertainty perceptions about the functionality of the innovation (as reflected in the shared assets, the digital platform, and other actors) as well as about their personal safety and privacy. Prior innovation research mainly focuses on product-related risks, such as the product performance dimension of risks (or functional risk;Kleijnenet al., 2009). The data suggest that functional risks associated with platform technology also appear to be of great concern for actors in collaborative consumption. This is especially important for peer service providers who are in a difficult social situation and depend solely (or largely) on the platform for an income. In particular, actors (especially peer service providers) might feel vulnerable when they perceive a high dependence on the platform given the potentially severe negative consequences incurred</p>	Hazée, S., et al. (2020). "Why customers and peer service providers do not participate in collaborative consumption." Journal of service management 31(3): 397-419.

				<p>(e.g. financial consequences), which may explain why they do not participate in collaborative consumption.</p> <p>8. The functional dimension of the risk barrier not only relates to the products (shared assets) and technology (digital platform) but also to other actors. The data suggest that customers and peer service providers indeed reject collaborative consumption because of perceived uncertainties related to the performance of the service counterpart (peer service provider or customer). Despite the numerous actions taken by platforms to bolster trust among actors and ensure good service performance (e.g. governance systems, ratings, verified profiles; Hartlet al., 2016; Tussyadiah and Pesonen, 2018), customers question the reliability of peer service providers and, by extension, the functionality of the assets made available by peers, as the latter are commonly not perceived as professional experts. Likewise, peer service providers tend to believe that customers behave differently and are less respectful (e.g. context-specific issues include “not arriving within stated check-in time without warning ”and “stealing stuff such as mouthwash, deodorant, hygiene products that were kindly provided for use ”), when they deal with peer service providers compared to professional companies, which may lead to potential negative consequences. Accordingly, peer service providers also worry about the uncertain performance of customers in collaborative consumption, that is, the extent to which customers will perform their role on a consistent and accurate basis</p>	
4	Psychological - Compatibility barrier	Ethical challenges	Ecosystem Governance	<p>9. Compatibility barrier. Echoing prior innovation research (e.g. Karahanna et al., 2006), the data suggest that the compatibility barrier in collaborative consumption is best conceptualized as a multidimensional construct. In particular, compatibility barriers arise when collaborative consumption conflicts with actors’ previous experience, social values, and usage patterns. Given the absence of a common law framework across countries regulating collaborative consumption (Light, 2018), conflicts with one’s social values can occur. For instance, actors may find collaborative consumption incompatible with their values because of the perceived illegal aspect of these exchanges (e.g. unfair competition, tax avoidance). Even though collaborative consumption may be regulated in some countries, actors still question the</p>	<p>Hazée, S., et al. (2020). "Why customers and peer service providers do not participate in collaborative consumption." <i>Journal of service management</i> 31(3): 397-419.</p>

				morality of these practices; they specifically worry about their exploitative nature, which would contribute to collective value destruction (e.g. lower wages, more time pressure, less job security, asocial working hours):	
5	Chicken and egg problem	Platform startup phenomena	PBE Phenomena	1. One particular challenge for emerging digital platforms is the chicken-and-egg problem: the platform needs both the complementor and the consumer side to ensure a valid value proposition, but neither side is willing to join as long as the other side is not populated (Caillaud and Jullien 2003).	Hein, A., et al. (2019). "Digital platform ecosystems." Electronic Markets 30(1): 87-98.
5	Multi-homing	Platform properties	PBE Phenomena	2. Another factor that influences the performance of digital platforms is the multi-homing behavior of users by reducing the exclusivity and dominant-firm equilibria (Koh and Fi ch ma n 2014 ; Caillaud and Jullien 2003).	Hein, A., et al. (2019). "Digital platform ecosystems." Electronic Markets 30(1): 87-98.
6	Novel extension to core value proposition of the PBE	PBE/product innovation	PBE Innovation	1. A p latfor m o ffers a compelling set of co re va lue propositions to its consumers (Parker et al.201 6). Applications on the platform play off the core va lues and add novel e xtension s to t h e p latfor m's capabilities (Koc h a nd Bier bamer2016).	Hevner, A. and O. Malgonde (2019). "Effectual application development on digital platforms." Electronic Markets 29(3): 407-421.
6	Platform owner approval	Control	Ecosystem Governance	4. All applications must adhere to connection specifications and development procedures determined by the platform (Tiwana 2013). Platforms provide standard connection interfaces 2 in the form of application programming interface s (API's) that are used by applications to access common features within the platform. Thus, platform owners and user groups often require that application produces follow certain best practices such as 'look and feel' interactions. In many cases , the platform owners evaluate and approve new applications before they are offered to consumers via the platform .	Hevner, A. and O. Malgonde (2019). "Effectual application development on digital platforms." Electronic Markets 29(3): 407-421.
6	Assimilation in the PBE due to demand	Assimilation	Competition	3. As the number of similar applications on a software platform increases, investment incentives for individual producers are crowded out (Boudreau 2012). Similarity of applications available via a platform limits the platform's value proposition and incentivizes the platform to assimilate those features into the core value proposition of the platform .Consequently, applications whose value proposition is assimilated into the core offering of the platform are discontinued.	Hevner, A. and O. Malgonde (2019). "Effectual application development on digital platforms." Electronic Markets 29(3): 407-421.

6	Evolution with core values of PBE	Evolution	PBE Phenomena	2. Over time, the platform core values evolve based on consumer demands and goals (Haile and Altmann 2016) and, as a result, platform applications are added, updated, and dropped.	Hevner, A. and O. Malgonde (2019). "Effectual application development on digital platforms." <i>Electronic Markets</i> 29(3): 407-421.
6	Evolution with PBE regulations and requirements	Evolution	PBE Phenomena	5. Platforms exhibit different levels of maturity over time. Changes to platform architecture, governance, and curation mechanisms requires application producers to adapt their applications and routines to comply with updated platform regulations. For example, Microsoft Azure 3 platform releases multiple new and updated features every week. As features are introduced and updated, platform's maturity improves which impacts application development teams' decisions (e.g. upgrade, obsolete) about their application.	Hevner, A. and O. Malgonde (2019). "Effectual application development on digital platforms." <i>Electronic Markets</i> 29(3): 407-421.
7	Control design	Control	Ecosystem Governance	2. As digital technologies allow for myriad connections with other products and services that continue to evolve (Yoo et al., 2012; Henfridsson et al., 2018), the increasing complexity of those connections makes it more difficult for firms to control and manage their platforms, requiring coordination at technical and organizational levels.	Hilbolling, S., et al. (2019). "Complementors as connectors: managing open innovation around digital product platforms." <i>R & D management</i> 50(1): 18-30.
7	Interdependency as innovation roadblock	Innovation roadblock	PBE Innovation	7. As a consequence of the increasing number of connections realized by complementors, our findings suggest that such interdependencies may constrain innovation opportunities for digital platform owners over time. When every update of a digital product platform can have far reaching consequences for the stability and quality of the user experience – possibly jeopardizing the integrity of the entire system – platforms become path dependent and less attractive for generating innovations.	Hilbolling, S., et al. (2019). "Complementors as connectors: managing open innovation around digital product platforms." <i>R & D management</i> 50(1): 18-30.
7	Balance between competition and collaboration	Balancing competition and collaboration	Competition	3. Opening a digital product platform poses additional challenges on an organizational level. For example, platform owners and complementors need to navigate complex strategic landscapes involving competition and collaboration (Gawer and Cusumano, 2014),	Hilbolling, S., et al. (2019). "Complementors as connectors: managing open innovation around digital product platforms." <i>R & D management</i> 50(1): 18-30.

7	Modularity as unpredictable evolution	Modularity and fragmentation	Architecture	5. Extant research on digital platforms suggests that standardized interfaces can facilitate coordination between the platform owner and complementors also on an organizational level, because conformance to a standardized API allows third parties to innovate autonomously without explicit coordination between the platform owner and complementors (Ghazawneh and Henfridsson, 2013). However, this is precisely what drives the rapid evolution of a digital platform by highly distributed parties (Tiwana, 2013), which makes the evolution of a platform and its complementary products so unpredictable and difficult to manage (Garud et al., 2008; Yoo et al., 2012).	Hilbolling, S., et al. (2019). "Complementors as connectors: managing open innovation around digital product platforms." R & D management 50(1): 18-30.
7	Realisation of effective governance	Effectiveness of governance	Ecosystem Governance	1. The sheer amount and variety of complements are challenging to coordinate through bilateral, intensive partnerships, but also arm's length coordination is likely insufficient when complements provide core value to platform users.	Hilbolling, S., et al. (2019). "Complementors as connectors: managing open innovation around digital product platforms." R & D management 50(1): 18-30.
7	Value loss due to high variance and fragmentation	Modularity and fragmentation	Architecture	4. ensure that the value of the platform is not diminished for developers and users by becoming too varied and fragmented (West and Gallagher, 2006). 6. the task for platform owners to safeguard the user experience (Rowland et al., 2015) and overall system integrity gets more difficult	Hilbolling, S., et al. (2019). "Complementors as connectors: managing open innovation around digital product platforms." R & D management 50(1): 18-30.
8	Conflict of interest as result of diversification	Collaborative Consumption	Specifics of business model	2. the diversification of providers gives rise to several conflicts of interest that might hinder the positive sustainability effects of their individual and collective initiatives, making it necessary to redefine the relationships between private solution providers and local authorities. 5. The perspective refers to transactional arrangements between self-interested actors that are shaped by information asymmetries and incongruent objectives (Pavlou et al. 2007). In the smart city context, Cohen and Kietzmann (2014) applied the theory to investigate conflicting goals in the relationship between local governments and shared mobility solution providers and called for more research to "explore the various, and often contradictory roles the different agents and principals play in sharing economies" (p. 293).	Hildebrandt, B., et al. (2018). "Sharing Yet Caring." Business & Information Systems Engineering 60(3): 227-241.

8	Functional - Risk barrier	Ecosystem relations	Ecosystem Governance	<p>1. However, the digitally enabled separation of ownership and use brings along the risk of moral hazard by consumers using resources in careless or wasteful ways, which is detrimental to the sustainability of the overall system</p> <p>3. In addition, Bardhi and Eckhardt (2012) allude to a dark side of such business models at the consumer interface that results from the separation of use from ownership</p> <p>4. such as increased resource and energy consumption in commercial accommodations (Miao and Wei 2013) or “excessive wear and tear and overuse of the product” (Leismann et al. 2013, p. 192) in shared tool usage, indicating the systemic nature of such potential downsides associated with ABC</p>	Hildebrandt, B., et al. (2018). "Sharing Yet Caring." Business & Information Systems Engineering 60(3): 227-241.
9	High market dynamism	Market dynamics	Specifics of business model	Here the notion of dynamism plays a very important role. The companies' executives that were interviewed generally resist the possibility to predict the direction of the market development and make the right strategic “bets.” In the words of one of the respondents: “The market evolves at such a pace that by the time we would formalize a strategy it would be completely useless.”	Kabakova, O., et al. (2016). "Strategizing for Financial Technology Platforms: Findings from Four Russian Case Studies." Psychology & marketing 33(12): 1106-1111.
11	Assembly of initial membership	Platform startup phenomena	PBE Phenomena	7. Leveraging resources to assemble initial membership	Khanagha, S., et al. (2020). "Mutualism and the dynamics of new platform creation: A study of cisco and fog computing." Strategic management journal.
11	Fear of lock-in	Platform dynamics	PBE Phenomena	3. To alleviate fears about possible lock-in, it may also need to reassure potential members about the platform's openness, while also maintaining the required level of control to capture value (Boudreau, 2010).	Khanagha, S., et al. (2020). "Mutualism and the dynamics of new platform creation: A study of cisco and fog computing." Strategic management journal.
11	Unpredictability of market	Market dynamics	Specifics of business model	6. A platform creator cannot anticipate all these twists and turns upfront when seeding the platform, and some strategies only emerge as the platform adapts to evolving market needs during scaling. We thus need to understand the dynamic deployment of material and symbolic strategies.	Khanagha, S., et al. (2020). "Mutualism and the dynamics of new platform creation: A study of cisco and fog computing." Strategic management journal.

11	Gaining legitimacy while not endangering acquired position in existing ecosystem	Legitimacy	PBE Phenomena	<p>2. While creating a de novo platform is an uphill battle for any firm, it becomes particularly challenging for an established firm that has stakes in the existing platform ecosystem (Bennett, Seamans, & Zhu, 2015) as a client, partner, or complementor and does not want to undermine its position in that ecosystem. For instance, when an infrastructure leader such as Ericsson is aspiring to create a new digital platform (e.g., in transportation), it seeks legitimacy in the new ecosystem by providing distinct value, but it does not want to undermine its legitimacy in its existing ecosystem where its key customers (e.g., a mobile operator) are targeting the same market (Khanagha, Ramezan Zadeh, Mihalache, & Volberda, 2018).</p> <p>14. To avoid the new platform being rejected, the company needs to legitimize it among targeted adopters (Vasudeva, Spencer, & Teege, 2013), while also preserving legitimacy in the existing ecosystem (Aldrich & Ruef, 2006) on which it also depends. Gaining legitimacy matters, as the very concept of an ecosystem is based on the idea that every organism is interdependent on other organisms within the system and gaining acceptance from them is therefore crucial (Moore, 1996). To secure legitimacy, a platform creator needs to identify opportunities for mutual coexistence, whereby the new platform enhances the viability of the dominant platform.</p>	Khanagha, S., et al. (2020). "Mutualism and the dynamics of new platform creation: A study of cisco and fog computing." Strategic management journal.
11	Cognitive legitimacy	Legitimacy	PBE Phenomena	<p>4. The new platform needs to show a sufficient degree of familiarity and alignment with the existing platform, because if it is perceived to be too novel, distinctive, or disconnected, cognitive legitimacy may be hard to gain (Hargadon & Douglas, 2001; Ozalp & Kretschmer, 2019; Zhao, Fisher, Lounsbury, & Miller, 2017)</p>	Khanagha, S., et al. (2020). "Mutualism and the dynamics of new platform creation: A study of cisco and fog computing." Strategic management journal.
11	Challenge to become dominant platform	Dominance	Competition	<p>1. When the odds are against a firm being able to assume a leadership position in a dominant platform ecosystem, it may respond by joining the platform to capture value; Toys R Us joined Amazon, for example, rather than creating its own online distribution channel (Zhu & Liu, 2018). This can potentially lead to deterioration of the firm's core capabilities and prevent it from having a voice in the platform's architecture (Baldwin, 2018; Jacobides, MacDuffie, & Tae, 2016; Schilling, 2009). A more competitive response might be to create a new platform by either acquiring a platform (e.g., IBM acquiring Red-Hat to provide hybrid Cloud platforms) or establishing its own platform—as Apple did with</p>	Khanagha, S., et al. (2020). "Mutualism and the dynamics of new platform creation: A study of cisco and fog computing." Strategic management journal.

				iOS—using technology leapfrogging, for example, (Schilling, 2003). The risk here is that it may fail to outcompete or “dethrone” the rival platform, despite extensive investments (Cusumano et al., 2019; Suarez & Kirtley, 2012). 8. Developing exclusivity to establish a leadership identity	
11	Balance between competition and collaboration	Balancing competition and collaboration	Competition	5. In addition, misalignment may draw resistance from members of the dominant platform, especially if there are clashes with that platform's technological architecture (Henderson & Clark, 1990) or threats to its dominance (Garud, Jain, & Kumaraswamy, 2002). 9. Signalling complementarity and collaboration to cultivate positive interdependence 12. Second, we observed that many companies did not want to participate in fog computing because it was seen to be Cisco's exclusive technology. In an interview with us, a senior strategy executive from a Cisco rival said that they had been warned against using Fog because it was known to be a “Cisco term” [Interview with Head of IoT unit at a Cisco rival]. Although owning the fog computing brand and having architectural control helped Cisco to attract an initial set of users to the new platform, it also limited its further expansion. 13. Relinquishing exclusivity and relying on lasting recognition as the platform leader	Khanagha, S., et al. (2020). "Mutualism and the dynamics of new platform creation: A study of cisco and fog computing." Strategic management journal.
11	Awareness and collaboration	Platform startup phenomena	PBE Phenomena	11. a need for collaboration and partnerships with vendors and academia, and a need for increased awareness of Fog's benefits and applications in a wider set of industries	Khanagha, S., et al. (2020). "Mutualism and the dynamics of new platform creation: A study of cisco and fog computing." Strategic management journal.
11	Interoperability with complement or apps	Interoperability	Architecture	10. interoperability issues concerning fog technologies and applications from various vendors	Khanagha, S., et al. (2020). "Mutualism and the dynamics of new platform creation: A study of cisco and fog computing." Strategic management journal.
12	Reaching of financial viability	Finance	Ecosystem Governance	1. Indeed, high rates of failure among HIE ventures have raised questions in practitioner and scholarly communities related to the viability of these businesses (Zhang et al. 2016). Although early venture funding and grants may	Khuntia, J., et al. (2017). "How Service Offerings and Operational Maturity Influence the Viability of Health

				help new firms to initiate operations, achieving financial viability is critical to support and maintain operations in the long run (Bamford et al.	Information Exchanges." Production and operations management 26(11): 1989-2005.
13	Chicken and egg problem	Platform startup phenomena	PBE Phenomena	Specifically, because of the two-sided market properties, it is difficult to build a business ecosystem spontaneously if the platform cannot surpass critical mass. That is, research on how to gather users in the early stage is important not only to academia but also for successful market access by digital platform providers. In the platform-based model, finding the right market entry strategy is a critical factor in creating a successful business (Evans and Schmalensee, 2010), and this study identifies the factors behind successful market access, overcoming the chronic chicken-egg problem in a two-sided market	Kim, J. (2018). "Market entry strategy for a digital platform provider." Baltic journal of management 13(3): 390-406.
14	Network effects	Platform properties	PBE Phenomena	1. Simply put, platforms have been described as digital matchmakers that connect a variety of users and producers, making it easy for them to get together and do business. It is essential but challenging for platforms to simultaneously attract users and producers (Parker et al., 2016), as both participants are needed in order for value to be created (Evans & Schmalensee, 2016). However, true platform innovators do more than use data-driven algorithms to drive better buyer–seller matches: they also empower participants to create value with each other, which leads to multi-sided surplus and more value (Van Alstyne & Schrage, 2016), hence network effects play a key role.	Korhonen, H., et al. (2017). "The Core Interaction of Platforms: How Startups Connect Users and Producers." Technology innovation management review 7(9): 17-29.
15	Piracy	Regulatory	Ecosystem Governance	For many platform companies, a critical issue is understanding how piracy and imitation should be regulated, motivated in part by a common narrative that piracy will eliminate innovation on these platforms	Miric, M. and L. B. Jeppesen (2020). "Does piracy lead to product abandonment or stimulate new product development? Evidence from mobile platform-based developer firms." Strategic management journal.
16	Trust	Ecosystem	Ecosystem	9. low consumer trust 6. This apart from convincing price conscious customer to shift preference from cash to cards and using apps instead of telephone to book taxis.	Mukerji, M. and P. S. Roy (2019). "Platform Interactions and Emergence of an Organizational

		relations	Governance		Field: Case Study on Ola." AJIS. Australasian journal of information systems 23.
16	Low technology penetration level	Local challenges	Specifics of business model	3. issues of low penetration of credit cards and smartphones	Mukerji, M. and P. S. Roy (2019). "Platform Interactions and Emergence of an Organizational Field: Case Study on Ola." AJIS. Australasian journal of information systems 23.
16	Inadequate infrastructure	Local challenges	Specifics of business model	4. inadequate logistics and supporting infrastructure	Mukerji, M. and P. S. Roy (2019). "Platform Interactions and Emergence of an Organizational Field: Case Study on Ola." AJIS. Australasian journal of information systems 23.
16	Chicken and egg problem	Platform startup phenomena	PBE Phenomena	2. Since networks generate value only when adequate number of both service providers and customers transact with each other, it was imperative for Ola to on-board as many taxi drivers and customers as quickly as possible	Mukerji, M. and P. S. Roy (2019). "Platform Interactions and Emergence of an Organizational Field: Case Study on Ola." AJIS. Australasian journal of information systems 23.
16	Cognitive legitimacy	Legitimacy	PBE Phenomena	1. While technology was available to translate network logics into an innovative product, building a sustainable and scalable digital platform was a challenge. As a pioneering ridesharing start-up, Ola faced the uphill task of creating awareness about the business proposition of new technology product, building trust and convincing stakeholders to adopt their online offerings.	Mukerji, M. and P. S. Roy (2019). "Platform Interactions and Emergence of an Organizational Field: Case Study on Ola." AJIS. Australasian journal of information systems 23.
16	Low level of disposable income	Local challenges	Specifics of business model	5. low levels of disposable income.	Mukerji, M. and P. S. Roy (2019). "Platform Interactions and Emergence of an Organizational Field: Case Study on Ola." AJIS. Australasian journal of information systems 23.

16	Reaching of financial viability	Finance	Ecosystem Governance	7. However, once scale was achieved, Ola sought profitability and started rationalizing its operating expenses. This led to tougher performance norms for drivers that impacted earnings and investments. Drivers were not able to pay their EMIs for car loans taken. Within a short span of time, such strikes happened in many parts of the country.	Mukerji, M. and P. S. Roy (2019). "Platform Interactions and Emergence of an Organizational Field: Case Study on Ola." <i>AJIS. Australasian journal of information systems</i> 23.
16	Legal challenges	Regulatory	Ecosystem Governance	8. further, as the number of digital platforms increased, so did the coercive power of government and other regulatory bodies as issues related to data privacy, physical safety, surge pricing and tariff issues. Regulatory issues also manifest with regards to better work norms and working conditions of drivers and delivery boys.	Mukerji, M. and P. S. Roy (2019). "Platform Interactions and Emergence of an Organizational Field: Case Study on Ola." <i>AJIS. Australasian journal of information systems</i> 23.
17	management and control of platforms	Control	Ecosystem Governance	6. management and control of platforms 9. how to control such platforms	Müller, J. M. (2019). "Antecedents to Digital Platform Usage in Industry 4.0 by Established Manufacturers." <i>Sustainability (Basel, Switzerland)</i> 11(4): 1121.
17	high coordination efforts	Coordination	Ecosystem Governance	3. high coordination efforts 13. The results indicate the high coordination efforts represent a further challenge that was mentioned by 46 out of 102 experts. From a technical point of view, it is difficult to create interfaces between the platform and the players that enable smooth data exchange. Here it comes into question which players will prevail in setting the standards and which players need to invest to meet the interfaces' requirements. From a juridical point of view, it is difficult to enter into a contract as such contracts are rather difficult to design. When these initial challenges are overcome, there remain efforts such as to generate a common vision and strategy for the platform, requiring high short-term investments with unclear and undetermined amortization.	Müller, J. M. (2019). "Antecedents to Digital Platform Usage in Industry 4.0 by Established Manufacturers." <i>Sustainability (Basel, Switzerland)</i> 11(4): 1121.
17	Relationships between the entities	Coordination	Ecosystem Governance	7. relationships between the entities 10. how to manage the relationships between players adequately	Müller, J. M. (2019). "Antecedents to Digital Platform Usage in Industry 4.0 by Established Manufacturers."

					Sustainability (Basel, Switzerland) 11(4): 1121.
17	Lack of trust	Ecosystem relations	Ecosystem Governance	<p>1. lack of trust</p> <p>11. The results indicate the biggest challenge as for digital platforms is lacking trust between the players that hinders a smooth implementation and usage of platforms, named by 53 out of 102 experts. First, in order to ensure smooth transactions and communication between players, a certain level of transparency need to be maintained. This includes sensible data, such as infrastructure, capacities, and cost structure. Some fear that being transparent strengthens competitors instead of bringing individual profits. Second, investing in infrastructure and committing oneself to a platform, increases the costs to cut the strings and terminate the business. In turn, this decreases individual player's bargaining power as they become more dependent on a platform. Subsequently, they must accept what they might not like due to the lack of (financially reasonable) alternatives</p> <p>20. lacking trust</p>	<p>Müller, J. M. (2019). "Antecedents to Digital Platform Usage in Industry 4.0 by Established Manufacturers." Sustainability (Basel, Switzerland) 11(4): 1121.</p>
17	Independence Preferred by Complementors	Ecosystem relations	Ecosystem Governance	16. the fact that some players prefer being independent	<p>Müller, J. M. (2019). "Antecedents to Digital Platform Usage in Industry 4.0 by Established Manufacturers." Sustainability (Basel, Switzerland) 11(4): 1121.</p>
17	Finding adequate partners	Platform startup phenomena	PBE Phenomena	15. Further challenges include difficulties in finding adequate partners	<p>Müller, J. M. (2019). "Antecedents to Digital Platform Usage in Industry 4.0 by Established Manufacturers." Sustainability (Basel, Switzerland) 11(4): 1121.</p>
17	loss of confidential information	Data Management	Ecosystem Governance	<p>4. loss of confidential information</p> <p>14. A likewise important challenge is the loss of confidential information that was mentioned by 45 out of 102 experts. Many companies do not trust in digital information sharing in general and prefer offline communication. Additionally, many fear that confidential information may be passed on to third</p>	<p>Müller, J. M. (2019). "Antecedents to Digital Platform Usage in Industry 4.0 by Established Manufacturers."</p>

				parties resulting from industry espionage and hacker attacks. 21. losing confidential information	Sustainability (Basel, Switzerland) 11(4): 1121.
17	data ownership	Data Management	Ecosystem Governance	5. data ownership 8. Additionally, further issues remain unresolved, such as, to whom data belongs to 17. unsolved questions about data ownership (mentioned by 24 out of 102 experts). 18. data ownership and data usage rights	Müller, J. M. (2019). "Antecedents to Digital Platform Usage in Industry 4.0 by Established Manufacturers." Sustainability (Basel, Switzerland) 11(4): 1121.
17	Competitive thinking	Competitive thinking	Competition	2. competitive thinking 12. Fifty one out of 102 experts named competitive thinking as a challenge of digital platforms. Working together on a platform requires a collaborative and cooperative thinking. However, individual players tend to focus on their own benefits, strive for their own profit, and behave in a selfish way, which hinders smooth transactions and interactions on platforms. This may culminate in an unwillingness to cooperate impeding the idea of doing business on a platform. Furthermore, there is a lack of understanding that collective benefits in the long run are larger when players work together. Individual player might need to take the risk of suboptimal decisions from an individual perspective and lower individual short-term profits. Yet, it is a challenge to ensure an understanding for this given the individual interests and incentives of players, managers, and employees.	Müller, J. M. (2019). "Antecedents to Digital Platform Usage in Industry 4.0 by Established Manufacturers." Sustainability (Basel, Switzerland) 11(4): 1121.
18	Technology use inertia in User Organizations	User organizations	Specifics of business model	3. and socio -technical complexity that result from an organization's platform use as part of its digital infrastructure over longer time periods (Hanseth and Lyytinen, 2010)	Rolland, K. H., et al. (2018). "Managing Digital Platforms in User Organizations: The Interactions Between Digital Options and Digital Debt." Information Systems Research 29(2): 419-443.

18	Negative network effects	Platform properties	PBE Phenomena	1. Similarly, products, technologies, and services can increase the complexity in organizational platform management to a point that they eventually produce negative cross-side effects, even in successful platform ecosystems	Rolland, K. H., et al. (2018). "Managing Digital Platforms in User Organizations: The Interactions Between Digital Options and Digital Debt." Information Systems Research 29(2): 419-443.
18	Platform MGMT in User Organizations	User organizations	Specifics of business model	2. Similarly, products, technologies, and services can increase the complexity in organizational platform management 6. The interactions between digital options and digital debt during an organization's ongoing development and use of a digital platform in relation to the organization's digital infrastructure, where the development and use are shaped by responses to internal and external events • Digital options may increase or decrease an organization's ability to resolve digital platform debt • Digital debt may enable or hinder an organization's ability to realize digital platform options • An organization may resolve debt to develop digital options • An organization may plant digital debt to realize attractive digital options • An organization may leverage digital options to resolve digital debt 10. As evidenced at Media Company, decentralized regimes facilitated local innovation by developing and realizing options to extend the platform's core features (e.g., through options to integrate with complementary software). However, over longer periods of time, breaking away from the inertia resulting from uncoordinated choices required more centralized governance	Rolland, K. H., et al. (2018). "Managing Digital Platforms in User Organizations: The Interactions Between Digital Options and Digital Debt." Information Systems Research 29(2): 419-443.
18	locked in problem	Platform dynamics	PBE Phenomena	4. At the same time, digital platforms are part of an installed base of socio-technical arrangements (Star and Ruhleder, 1996; Aanestad and Jensen, 2011) with accumulated digital debt that make changes costly—as well as organizationally and technologically challenging 5. managing an organization's digital platforms and infrastructure cannot be separated from the wider platform ecosystems. Hence, a company using Google Docs will be somewhat dependent on how the Google platform ecosystem evolves.	Rolland, K. H., et al. (2018). "Managing Digital Platforms in User Organizations: The Interactions Between Digital Options and Digital Debt." Information Systems Research 29(2): 419-443.

18	Challenge to keep up with the ecosystem's evolution	Evolution	PBE Phenomena	7. This situation also underscored how Media Company needed to keep up with the wider platform ecosystem's ongoing evolution, which was occurring at a speed largely outside its control. As such, it had to invest considerable efforts in developing options that were not readily realizable—and that sometimes turned out not to be relevant for Media Company, as in the case of the mobile notification feature.	Rolland, K. H., et al. (2018). "Managing Digital Platforms in User Organizations: The Interactions Between Digital Options and Digital Debt." Information Systems Research 29(2): 419-443.
18	Challenge to develop the correct options	User organizations	Specifics of business model	9. This perspective informs how a user organization must mitigate against failing to develop options that otherwise would positively impact same-side and cross-side network effects (Parker et al., 2016).	Rolland, K. H., et al. (2018). "Managing Digital Platforms in User Organizations: The Interactions Between Digital Options and Digital Debt." Information Systems Research 29(2): 419-443.
18	Customization as cause for problems in future	Customization	Architecture	8. Company developed and realized digital options through customizations (software development on top of the platform) that made work much simpler for journalists and producers, but also produced new digital debt. While increasing the efficiency and accuracy in the work process for archiving TV program data, the Thomas module was a local fix that created barriers to migrating to different solutions for the metadata and archiving problem.	Rolland, K. H., et al. (2018). "Managing Digital Platforms in User Organizations: The Interactions Between Digital Options and Digital Debt." Information Systems Research 29(2): 419-443.
19	Challenge to control PBE to ensure focus and value capture	Control	Ecosystem Governance	1. little light has been shed on the innovation process itself and on the respective management techniques, in particular, on its control mechanisms to ensure focus and value capture in open platform environments	Scholten, S. and U. Scholten (2011). "Platform-based Innovation Management: Directing External Innovational Efforts in Platform Ecosystems." Journal of the knowledge economy 3(2): 164-184.
19	Actor orchestration	Coordination	Ecosystem Governance	4. platform owner has to orchestrate a complex self-organizing web of direct and indirect relationships between independent actors to co-create and deliver value	Scholten, S. and U. Scholten (2011). "Platform-based Innovation Management: Directing External Innovational Efforts in Platform Ecosystems."

					Journal of the knowledge economy 3(2): 164-184.
19	Challenge to continuously evolve value proposition to consumer	PBE/product innovation	PBE Innovation	2. platform owner is particularly challenged to continuously evolve the platform's overall value proposition to the consumer	Scholten, S. and U. Scholten (2011). "Platform-based Innovation Management: Directing External Innovational Efforts in Platform Ecosystems." Journal of the knowledge economy 3(2): 164-184.
19	Challenge to innovate the core platform	PBE/product innovation	PBE Innovation	3. Besides innovating the core platform	Scholten, S. and U. Scholten (2011). "Platform-based Innovation Management: Directing External Innovational Efforts in Platform Ecosystems." Journal of the knowledge economy 3(2): 164-184.
19	Information asymmetry	Data Management	Ecosystem Governance	5. a) information asymmetry (as service providers lack a comprehensive market view)	Scholten, S. and U. Scholten (2011). "Platform-based Innovation Management: Directing External Innovational Efforts in Platform Ecosystems." Journal of the knowledge economy 3(2): 164-184.
19	Goal incongruence with the platform owner's objectives	Evolution	PBE Phenomena	6. goal incongruence with the platform owner's objectives.	Scholten, S. and U. Scholten (2011). "Platform-based Innovation Management: Directing External Innovational Efforts in Platform Ecosystems." Journal of the knowledge economy 3(2): 164-184.
20	Lack of understanding of	Ecosystem	Ecosystem	5. lack of understanding of how – and the extent to which–app developers collaborate	van Angeren, J., et al. (2016). "Can we ask you to collaborate? Analyzing app developer

	complement or collaboration	relations	Governance		relationships in commercial platform ecosystems." The Journal of systems and software 113: 430-445.
20	Ecosystem governance	Effectiveness of governance	Ecosystem Governance	6. ecosystem governance becomes a critical issue	van Angeren, J., et al. (2016). "Can we ask you to collaborate? Analyzing app developer relationships in commercial platform ecosystems." The Journal of systems and software 113: 430-445.
20	How and when to open ecosystem for increased complementarity	Platform dynamics	PBE Phenomena	2. as how and when to open up an ecosystem to increase the involvement of app developers	van Angeren, J., et al. (2016). "Can we ask you to collaborate? Analyzing app developer relationships in commercial platform ecosystems." The Journal of systems and software 113: 430-445.
20	Platform owner dependence on complementors	Evolution	PBE Phenomena	1. Platform owners have become dependent on the extensions and applications built within their ecosystem to maintain their success	van Angeren, J., et al. (2016). "Can we ask you to collaborate? Analyzing app developer relationships in commercial platform ecosystems." The Journal of systems and software 113: 430-445.
20	How to maintain complement or activity	Evolution	PBE Phenomena	3. how to maintain persistent software development activity among app developers	van Angeren, J., et al. (2016). "Can we ask you to collaborate? Analyzing app developer relationships in commercial platform ecosystems." The Journal of systems and software 113: 430-445.

20	what ways can a platform owner manage competition among its app developers	Balancing competition and collaboration	Competition	4. what ways can a platform owner manage competition among its app developers	van Angeren, J., et al. (2016). "Can we ask you to collaborate? Analyzing app developer relationships in commercial platform ecosystems." The Journal of systems and software 113: 430-445.
21	Market dominance as legal liability	Regulatory	Ecosystem Governance	1. The two EU-verdicts both address Google's ability to control a vertically integrated system upstream and downstream, at the expense of consumers as buyers of products and services, i.e., phones with pre-installed apps or Google Shopping deals. In general, the verdicts intersect with consumers' short-term interest, as they aim at preventing discriminatory pricing and guaranteeing consumer choice; and they protect the interests of entrepreneurs, ensuring a level playing field for businesses large and small. A generous reading of the verdicts shows how the regulator keenly recognises that "pricing" is a dubious concept in an environment where most services are often free of charge and where data have become the prime currency. Indeed, the notion of datafication leads to an expansive conception of consumer interest where the potential combination of data flows from different services may be primarily aimed at personalisation and profiling to steer consumer behaviour (Crain, 2019). Implicitly, the verdicts also address a long-term broader concern: Alphabet's ability to integrate its own hardware, software, analytics, distribution, and marketing services allows them to collect, store, and process more data, which in turn provides enormous competitive advantages when entering new markets, using them against competitors who lack historical data. In capturing the constellation of digital markets, legislators and regulators are thus reinventing the notion of "consumers".	Van Dijck, J., et al. (2019). "Reframing platform power." Internet policy review 8(2): 1.
22	Chicken and egg problem	Platform startup	PBE Phenomena	1. In providing a valuable transportation service to passengers, a ride-sharing platform such as Uber is reliant on its ability to first attract a sufficient number of drivers, which in turn are more likely to join platforms with already established demand from passengers. Because of this, firms looking to	Veisdal, J. (2020). "The dynamics of entry for digital platforms in two-sided markets: a multi-case study." Electronic Markets.

		phenom ena		establish platform businesses in two-sided markets can prior to entry be faced with a "chicken-and-egg" problem (Caillaud and Jullien 2003 ; Kyprianou 2018), the so-called "circular conundrum" (Spulber2010) if the complementors are unfavourable (Hagiu 2006).	
23	Realisation of effective governance	Effectiv eness of governa nce	Ecosys tem Gover nance	However, platform enterprises find it difficult to adopt an effective and solid governance strategy to improve the two-sided matching efficiency through a platform-mediated network	Yi, J., et al. (2019). "Platform heterogeneity, platform governance and complementors' product performance: an empirical study of the mobile application industry." <i>Frontiers of business research in China</i> 13(1): 1-20.
24	Data protection	Regulat ory	Ecosys tem Gover nance	1. we use Influenzanet to illustrate challenges in protection of health and other sensitive information reported in participatory disease surveillance systems	Geneviève, L. D., et al. (2019). "Participatory Disease Surveillance Systems: Ethical Framework." <i>Journal of medical Internet research</i> 21(5): e12273-e12273.

Appendix 4: Interview protocol

Interview protocol User

Are there any questions from your side before we start the interview?

Do I have the permission to record the interview? This interview will not be published and will be used only for the research purpose. It will also be transcribed and sent to you for validation.

I will start the recording now.

Part 1

Introduction of the subject:

A digital platform is a software-based platform that provides a core functionality. The platform is designed with a stable technological core, with modular architecture in mind. Complementors add their modular products or services, using open interfaces (M. de Reuver et al., 2018; Gawer & Cusumano, 2014; Hein et al., 2019; Tiwana, 2014), and consumers are attracted by these complimentary, additional products and services and vice versa— the latter is also described as “network effects”. It is this moment when the platform grows into a platform ecosystem. The modularity fosters innovation but can also be limited by the governance approach of the platform ecosystem. In this context, we understand the term “platform”, as a digital platform serving a multi-sided market.

A challenge in the context of a PBE is understood as a situation, which is testing the platforms or their actor’s ability, inviting for a contest, and demanding special effort, to succeed (Dictionary.com, 2020; Press, 2020). It constitutes a phenomenon or behavior of PBE/the market/involved actors, which requires a (counter)action from an involved entity, to avoid undesirable outcomes or to reach desirable outcomes.

The purpose of this study is to improve awareness about challenges encountered by actors in PBE and with this potentially prepare them. Possibly we also could provide a list of potential strategies to solve them.

I would like to ask some questions about you, for sketching your background and experience.

What is your education level?

Please shortly describe your role in regard to- and interaction with the PBE.

How long have you been working in this role?

How long have you been working in this industry?

Can you shortly describe the main components of the PBE, in which you are and what is the role of your organization in it?

Can you name challenges or problematic situations and occurrences, which you have experienced within the platform-based business ecosystem?

(Name examples, if required by the interviewee)

Can you describe the circumstances of the named challenge?

Part 2

NB! Share the screen

This part is designed for validation of challenges found in literature.
The challenges I have found can be seen in this framework:

Category	Subcategory	Description	References
Architecture	Interoperability	Interoperability issues related to various technologies and vendor applications.	Khanagha et al. (2020)
	Customization	Customization issues, such as software development on top of the platform, with positive (e.g. increased ease of use for a specific purpose) and negative (future migration/technology update complications) consequences.	Rolland et al. (2018)
	Modularity and fragmentation	Standardized interfaces enable 3rd parties in autonomous innovation, carrying the risks of unpredictable modular evolution, fragmentation, and high variance. This can endanger the user experience and overall system integrity.	Hilbolling et al. (2019)
Competition	Competitive thinking	Competitive thinking as a challenge during the formation of PBE and resistance from other ecosystem members against the development of cospecialised assets.	Garud et al. (2020), Müller (2019)
	Assimilation	Challenge of assimilation of application into the core platform, if the value propositions of each are too similar or if the application has a very attractive value proposition.	Hevner and Malgonde (2019)
	Balancing competition and collaboration	Challenge to balance competitive and collaborative behaviors between the platform owner and complementor, resistance caused by misalignment or too strongly (perceived) dominance by one of the actors.	Hilbolling et al. (2019), Khanagha et al. (2020), van Angeren et al. (2016)
	Dominance	Challenge to become a dominant platform.	Khanagha et al. (2020)
Ecosystem Governance	Control	Challenges related to exercising of control, the degree of control on the PBE and the effectiveness of the control, creation of conscious control mechanisms, and involvement of all actors in this creation.	G. A. de Reuver et al. (2020), Han (2020), Hevner and Malgonde (2019), Hilbolling et al. (2019), Müller (2019), Scholten and Scholten (2011)
	Coordination	The challenges related to coordination, are the fact that it requires high effort such as the creation of interfaces, contract design, creation of a common vision and strategy. A challenge is also adequate management of relationships between PBE actors.	Müller (2019), Scholten and Scholten (2011)
	Data Management	Challenges, related to Data Governance and Management are loss of confidential information, data ownership and the rights to use it, and information asymmetry (mainly between the platform owner and the complementor).	Müller (2019), Scholten and Scholten (2011)
	Ecosystem relations	Uncertainty about the functionality of the innovations, personal safety, and privacy. Uncertainties regarding the performance of actors. Lack of and building of trust and transparency. Actors dependence on the PBE for income or	Hazée et al. (2020), Hildebrandt et al. (2018), Mukerji and Roy (2019),

		preference to remain independent. Insufficient understanding of actor collaboration mechanisms.	Müller (2019), van Angeren et al. (2016)
	Effectiveness of governance	Realisation of effective platform governance	Han (2020), Hilbolling et al. (2019), van Angeren et al. (2016), Yi et al. (2019)
	Ethical challenges	Actors (in collaborative consumption) might question the morality of the PBE practices (e.g. lower wages, more time pressure, less job security, asocial working hours), or the PBE and its services might conflict with an actor's previous experience, social values, and usage patterns.	Hazée et al. (2020)
	Finance	Challenges related to reaching of financial viability	Khuntia et al. (2017), Mukerji and Roy (2019)
	Regulatory	Issues related to piracy, data privacy and protection, physical safety, surge pricing, and tariff issues. Regulatory issues also manifest with regards to better work norms and working conditions. In some cases, market dominance might prove to be a legal liability for PBEs.	Mukerji and Roy (2019), Van Dijck et al. (2019), Geneviève et al. (2019), Miric and Jeppesen (2020)
PBE Innovation	Innovation acceptance	Innovation acceptance related challenges not only refer to the perceived difficulty associated with the understanding and usage of the innovation but also with its accessibility and the organization of the transaction.	Hazée et al. (2020)
	Innovation roadblock	Challenges related to blocked innovation due to the high amount of complementor connections.	Hilbolling et al. (2019)
	PBE/product innovation	Challenges related to the innovation of the core platform, its value proposition, addition of novel extensions. This includes also challenges related to the perception of the PBEs innovation state and capabilities, such as its network size, customer support quality.	Hazée et al. (2020), Hevner and Malgonde (2019), Scholten and Scholten (2011)
PBE Phenomena	Evolution	Challenges related to the ability of the complementors to adjust and coexist with the evolution of the core platform, the alignment of their goals. Challenges related to the platform owner's ability to adjust to the evolution of the ecosystem, the need to stimulate evolution.	Hevner and Malgonde (2019), Scholten and Scholten (2011), Rolland et al. (2018), van Angeren et al. (2016)
	Legitimacy	Challenges related to the PBEs cognitive legitimacy, socio-political legitimacy, or the lack thereof.	Garud et al. (2020), Khanagha et al. (2020), Mukerji and Roy (2019)
	Platform dynamics	Challenges related to the lock-in phenomenon, and platform openness.	Khanagha et al. (2020), Rolland et al. (2018), van Angeren et al. (2016)

	Platform properties	Challenges related to network effects (positive or negative) and multi-homing.	Garud et al. (2020), Hein et al. (2019), Korhonen et al. (2017), Rolland et al. (2018)
	Platform start-up phenomena	Challenges related to the "chicken and egg" problem, lack of adoption, and problems of assembly of initial membership. Further challenges are related to the need for awareness of the PBE and various collaborations and finding adequate partners for it.	Garud et al. (2020), Hazée et al. (2020), Hein et al. (2019), Khanagha et al. (2020), Kim (2018), Mukerji and Roy (2019), Müller (2019), Veisdal (2020)
Specifics of business model	Collaborative Consumption	Challenges related specifically to the collaborative consumption business model, such as the refusal of actors to participate, the contamination barrier, the image barrier, and the responsibility barrier. Additionally, also challenges related to conflicts of interest created by offering services/products already offered by the (local) government.	Hazée et al. (2020), Hildebrandt et al. (2018)
	Local challenges	Challenges related to a specific local situation: low technology penetration level, inadequate infrastructure, low level of disposable income.	Mukerji and Roy (2019)
	Market dynamics	Challenges related to the high dynamism and unpredictability of the market of the PBE.	Kabakova et al. (2016), Khanagha et al. (2020)
	User organizations	Challenges related to the PBE application in User Organisations: technology use inertia, platform management in the organization, and the challenge to develop the correct options.	Rolland et al. (2018)

I will shortly describe the challenge and ask you, whether you have experienced this challenge.
If yes, I will ask you some follow up questions.
If no, we will move on to the next challenge – in total there are 27.

Would you prefer to be able to read the questions on the screen while I read them to you?

Category: Specifics of business model

1. User organizations. Challenges related to the PBE application in User Organizations: technology use inertia, platform management in the organization and the challenge to develop the correct options.

Have you experienced any User organizations challenges? If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?

If yes, what strategy/solution can help to solve the challenge?

2. Collaborative Consumption. Challenges related specifically to collaborative consumption business model, such as refusal of actors to participate, the contamination barrier*, the image barrier** and the responsibility barrier***. Additionally, also challenges related to conflicts of interest created by offering services/products already offered by the (local) government.

*Customers and peer service providers may experience contamination concerns about the assets being shared in collaborative consumption because these assets have (or are likely to) come in physical contacts with previous customers and/or the peer service provider who owns the assets.

**This barrier refers to unfavourable associations regarding the platform provider's brand, the innovation category, and one's own brand.

***The responsibility barrier refers to actors concerns about being held responsible for their own or other actors' usage of the innovation or of the shared assets.

Have you experienced any Collaborative Consumption challenges? If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?

If yes, what strategy/solution can help to solve the challenge?

3. Local challenges. Challenges related to a specific local situation: low technology penetration level, inadequate infrastructure, low level of disposable income.

Have you experienced any Local challenges? If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?

If yes, what strategy/solution can help to solve the challenge?

4. Market dynamics. Challenges related to the high dynamism and unpredictability of the market of the PBE.

Have you experienced any Market dynamics challenges? If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?
If yes, what strategy/solution can help to solve the challenge?
1.00

Category: Ecosystem Governance

1. Control. Challenges related to exercising of control, the degree of control on the PBE and the effectiveness of the control, creation of conscious control mechanisms and involvement of all actors in this creation.

Have you experienced any control challenges? If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?
If yes, what strategy/solution can help to solve the challenge?

2. Coordination. The challenges related to coordination, are the fact that it requires high effort such as creation of interfaces, contract design, creation of a common vision and strategy. A challenge is also adequate management of relationships between PBE actors.

Have you experienced any coordination challenges? If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?
If yes, what strategy/solution can help to solve the challenge?

3. Data Management. Challenges, related to Data Governance and Management are loss of confidential information, data ownership and the rights to use it, and information asymmetry (mainly between the platform owner and the complementor).

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Have you experienced any Data Management challenges? If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?
If yes, what strategy/solution can help to solve the challenge?

4. Ecosystem relations. Uncertainty about the functionality of the innovations, personal safety and privacy. Uncertainties in regard to the performance of actors. Lack of and building of trust and transparency. Actors dependence on the PBE for income or preference to remain independent. Insufficient understanding of actor collaboration mechanisms.

Have you experienced any Ecosystem relations challenges? If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?
If yes, what strategy/solution can help to solve the challenge?

5. Effectiveness of governance. Realization of effective platform governance*.

*Effective governance occurs when an organisation has the capacity, legitimacy and authority to deliver services, regulate the economy, maintain order, collect and use revenue, and act in the good for the organisation as a whole.

Have you experienced any Effectiveness of governance challenges? If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?

If yes, what strategy/solution can help to solve the challenge?

6. Ethical challenges. Actors (in collaborative consumption) might question the morality of the PBE practices (e.g. lower wages, more time pressure, less job security, asocial working hours) or the PBE and its services might conflict with an actor's previous experience, social values, and usage patterns.

Have you experienced any Ethical challenges? If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?

If yes, what strategy/solution can help to solve the challenge?

7. Finance. Challenges related to reaching of financial viability.

Have you experienced any finance challenges? If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?

If yes, what strategy/solution can help to solve the challenge?

8. Regulatory. Issues related to piracy, data privacy and protection, physical safety, surge pricing and tariff issues. Regulatory issues also manifest with regards to better work norms and working conditions. In some cases, market dominance might prove to be a legal liability for PBEs.

Have you experienced any Regulatory challenges? If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?

If yes, what strategy/solution can help to solve the challenge?

Category: PBE Phenomena

1. Evolution. Challenges related to the ability of the complementors to adjust and coexist with the evolution of the core platform, the alignment of their goals. Challenges related to the platform owner's ability to adjust to the evolution of the ecosystem, the need to stimulate evolution.

Have you experienced any Evolution challenges? If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?

If yes, what strategy/solution can help to solve the challenge?

2. Legitimacy. Challenges related to the PBEs cognitive legitimacy*, socio-political legitimacy** or the lack thereof (such as inability to attract resources due to PBEs newness or problems with fitting into the industry relations).

*Cognitive legitimacy refers to “knowledge about the new activity and what is needed to succeed in an industry”

**Socio-political legitimacy refers to the “the value placed on an activity by cultural norms and political authorities”

Have you experienced any Legitimacy challenges? If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?

If yes, what strategy/solution can help to solve the challenge?

3. Platform dynamics. Challenges related to the lock-in phenomenon*, and platform openness**.

*The ways in which a platform can make it more desirable for existing adopters to not jump ship to a rival

**the level of how easy/difficult it is for an actor to join or exit a platform

Have you experienced any Platform dynamics challenges? If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?

If yes, what strategy/solution can help to solve the challenge?

4. Platform properties. Challenges related to network effects* (positive or negative) and multi-homing**.

*A property of a technology solution where every additional user makes it more valuable to every other user on the same side (same-side network effects) or the other side (cross-side network effects)

**When a participant on either side participates in more than one platform ecosystem

Have you experienced any Platform properties challenges? If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?

If yes, what strategy/solution can help to solve the challenge?

5. Platform start-up phenomena. Challenges related to the "chicken and egg"* problem, lack of adoption and problems of assembly of initial membership. Further challenges are related to the need for awareness of the PBE and various collaborations and finding adequate partners for it.

*The dilemma that neither side will find a two-sided technology solution with potential network effects attractive enough to join without a large presence of the other side

Have you experienced any Platform start-up phenomena challenges? If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?

If yes, what strategy/solution can help to solve the challenge?

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Category Architecture:

1. **Interoperability.** Interoperability issues related to various technologies and vendor applications.

Have you experienced any interoperability challenges?

If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?

If yes, what strategy/solution can help to solve the challenge?

2. **Customization.** Customization issues, such as software development on top of the platform, with positive (e.g. increased ease of use for a specific purpose) and negative (future migration /technology update complications) consequences.

Have you experienced any customization challenges?

If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?

If yes, what strategy/solution can help to solve the challenge?

3. **Modularity and fragmentation.** Standardized interfaces enable 3rd parties in autonomous innovation, carrying the risks of unpredictable modular evolution, fragmentation and high variation. This can endanger the user experience and overall system integrity.

Have you experienced any modularity and fragmentation challenges?

If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?

If yes, what strategy/solution can help to solve the challenge?

Category Competition:

1. **Competitive thinking.** Competitive thinking as challenge during formation of PBE and resistance from other ecosystem members against development of co-specialized* assets.

*An asset is said to be cospecialized when it relies upon another asset in order to succeed. Both assets are so highly specialized that they are dependent upon each other: one is of no use for anything else or without the other. Asset here generally refers to an intellectual property or business method, product, service, etc., which is an asset of a corporation and can be exploited by them by way of trade.

Have you experienced any competitive thinking challenges? If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?

If yes, what strategy/solution can help to solve the challenge?

2. **Assimilation.** Challenge of assimilation of application into the core platform, if the value propositions of each are too similar or if the application has a very attractive value proposition.

Have you experienced any assimilation challenges?
If yes, can you please shortly elaborate the circumstances?
Why is this challenge relevant for your PBE?
If yes, what strategy/solution can help to solve the challenge?

3. **Balancing competition and collaboration.** Challenge to balance competitive and collaborative behaviours between the platform owner and complementor, resistance caused by misalignment or too strongly (perceived) dominance by one of the actors.

Have you experienced any balancing competition and collaboration challenges?
If yes, can you please shortly elaborate the circumstances?
Why is this challenge relevant for your PBE?
If yes, what strategy/solution can help to solve the challenge?

4. **Dominance.** Challenge to become dominant platform.

Have you experienced any dominance challenges? If yes, can you please shortly elaborate the circumstances?
Why is this challenge relevant for your PBE?
If yes, what strategy/solution can help to solve the challenge?

Category: PBE Innovation

1. **Innovation acceptance.** Innovation acceptance related challenges not only refer to the perceived difficulty associated with the understanding and usage of the innovation but also with its accessibility and the organization of the transaction (the provided innovative product is difficult to access and the organisation of the transaction is too complex).

Have you experienced any Innovation acceptance challenges? If yes, can you please shortly elaborate the circumstances?
Why is this challenge relevant for your PBE?
If yes, what strategy/solution can help to solve the challenge?

2. **Innovation roadblock.** Challenges related to blocked innovation due to high amount of complementor connections, which create unexpected interdependencies. For example, when every update of a digital product platform can have far reaching consequences for the stability and quality of the user experience – possibly jeopardizing the integrity of the entire system – platforms become path dependent and less attractive for generating innovations.

Have you experienced any Innovation roadblock challenges? If yes, can you please shortly elaborate the circumstances?
Why is this challenge relevant for your PBE?
If yes, what strategy/solution can help to solve the challenge?

3. PBE/product innovation. Challenges related to the innovation of the core platform, its value proposition, addition of novel extensions. This includes also challenges related to the perception of the PBEs innovation state and capabilities, such as its network size, customer support quality.

Have you experienced any PBE/product innovation challenges? If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?

If yes, what strategy/solution can help to solve the challenge?

Part 3

Can you please describe any challenging situation, that you have experienced with the PBE, that has not been mentioned precisely in the framework above?

Can you please give your opinion on the completeness of the framework?

Do you think the challenge framework is helpful in your PBE? Why?

Do you intend to use the challenge framework in your PBE? Please explain.

Could you please consider connecting me to persons in the platform side or the complementor side?

Interview protocol Complementor

Part 2 (Only order of questions in Part 2 differentiated per interview protocol)

This part is designed for validation of challenges found in literature.

The challenges I have found can be seen in this framework:

I will shortly describe the challenge and ask you, whether you have experienced this challenge.

If yes, I will ask you some follow up questions.

If no, we will move on to the next challenge – in total there are 27.

Would you prefer to be able to read the questions on the screen while I read them to you?

Category: Ecosystem Governance

1. Control. Challenges related to exercising of control, the degree of control on the PBE and the effectiveness of the control, creation of conscious control mechanisms and involvement of all actors in this creation.

Have you experienced any control challenges? If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?

If yes, what strategy/solution can help to solve the challenge?

2. Coordination. The challenges related to coordination are the fact that it requires high effort such as creation of interfaces, contract design, creation of a common vision and strategy. A challenge is also adequate management of relationships between PBE actors.

Have you experienced any coordination challenges? If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?

If yes, what strategy/solution can help to solve the challenge?

3. Data Management. Challenges related to Data Governance and Management are loss of confidential information, data ownership and the rights to use it, and information asymmetry (mainly between the platform owner and the complementor).

Have you experienced any Data Management challenges? If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?

If yes, what strategy/solution can help to solve the

4. Ecosystem relations. Uncertainty about the functionality of the innovations, personal safety and privacy. Uncertainties in regard to the performance of actors. Lack of and building of trust and transparency. Actors dependence on the PBE for income or preference to remain independent. Insufficient understanding of actor collaboration mechanisms.

Have you experienced any Ecosystem relations challenges? If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?

If yes, what strategy/solution can help to solve the challenge?

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*Effective governance occurs when an organisation has the capacity, legitimacy and authority to deliver services, regulate the economy, maintain order, collect and use revenue, and act in the good for the organisation as a whole.

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Why is this challenge relevant for your PBE?

If yes, what strategy/solution can help to solve the challenge?

6. Ethical challenges. Actors (in collaborative consumption) might question the morality of the PBE practices (e.g. lower wages, more time pressure, less job security, asocial working hours) or the PBE and its services might conflict with an actor's previous experience, social values, and usage patterns.

Have you experienced any Ethical challenges? If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?

If yes, what strategy/solution can help to solve the challenge?

7. Finance. Challenges related to reaching of financial viability.

Have you experienced any finance challenges? If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?

If yes, what strategy/solution can help to solve the challenge?

8. Regulatory. Issues related to piracy, data privacy and protection, physical safety, surge pricing and tariff issues. Regulatory issues also manifest with regards to better work norms and working conditions. In some cases, market dominance might prove to be a legal liability for PBEs.

Have you experienced any Regulatory challenges? If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?

If yes, what strategy/solution can help to solve the challenge?

Category: PBE Phenomena

1. Evolution. Challenges related to the ability of the complementors to adjust and coexist with the evolution of the core platform, the alignment of their goals. Challenges related to the platform owner's ability to adjust to the evolution of the ecosystem, the need to stimulate evolution.

Have you experienced any Evolution challenges? If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?

If yes, what strategy/solution can help to solve the challenge?

2. Legitimacy. Challenges related to the PBEs cognitive legitimacy*, socio-political legitimacy** or the lack thereof (such as inability to attract resources due to PBEs newness or problems with fitting into the industry relations).

*Cognitive legitimacy refers to "knowledge about the new activity and what is needed to succeed in an industry"

**Socio-political legitimacy refers to the "the value placed on an activity by cultural norms and political authorities"

Have you experienced any Legitimacy challenges? If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?

If yes, what strategy/solution can help to solve the challenge?

3. Platform dynamics. Challenges related to the lock-in phenomenon*, and platform openness**.

*The ways in which a platform can make it more desirable for existing adopters to not jump ship to a rival

**the level of how easy/difficult it is for an actor to join or exit a platform

Have you experienced any Platform dynamics challenges? If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?

If yes, what strategy/solution can help to solve the challenge?

4. Platform properties. Challenges related to network effects* (positive or negative) and multi-homing**.

*A property of a technology solution where every additional user makes it more valuable to every other user on the same side (same-side network effects) or the other side (cross-side network effects)

**When a participant on either side participates in more than one platform ecosystem

Have you experienced any Platform properties challenges? If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?

If yes, what strategy/solution can help to solve the challenge?

5. Platform start-up phenomena. Challenges related to the "chicken and egg"* problem, lack of adoption and problems of assembly of initial membership. Further challenges are related to the need for awareness of the PBE and various collaborations and finding adequate partners for it.

*The dilemma that neither side will find a two-sided technology solution with potential network effects attractive enough to join without a large presence of the other side

Have you experienced any Platform start-up phenomena challenges? If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?

If yes, what strategy/solution can help to solve the challenge?

Category: Specifics of business model

1. User organizations. Challenges related to the PBE application in User Organizations: technology use inertia, platform management in the organization and the challenge to develop the correct options.

Have you experienced any User organizations challenges? If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?

If yes, what strategy/solution can help to solve the challenge?

2. Collaborative Consumption. Challenges related specifically to collaborative consumption business model, such as refusal of actors to participate, the contamination barrier*, the image barrier** and the responsibility barrier***. Additionally, also challenges related to conflicts of interest created by offering services/products already offered by the (local) government.

*Customers and peer service providers may experience contamination concerns about the assets being shared in collaborative consumption because these assets have (or are likely to) come in physical contacts with previous customers and/or the peer service provider who owns the assets.

**This barrier refers to unfavourable associations regarding the platform provider's brand, the innovation category, and one's own brand.

***The responsibility barrier refers to actors concerns about being held responsible for their own or other actors' usage of the innovation or of the shared assets.

Have you experienced any Collaborative Consumption challenges? If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?

If yes, what strategy/solution can help to solve the challenge?

3. Local challenges. Challenges related to a specific local situation: low technology penetration level, inadequate infrastructure, low level of disposable income.

Have you experienced any Local challenges? If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?

If yes, what strategy/solution can help to solve the challenge?

4. Market dynamics. Challenges related to the high dynamism and unpredictability of the market of the PBE.

Have you experienced any Market dynamics challenges? If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?

If yes, what strategy/solution can help to solve the challenge?

Category Competition:

1. Competitive thinking. Competitive thinking as challenge during formation of PBE and resistance from other ecosystem members against development of co-specialized* assets.

*An asset is said to be cospecialized when it relies upon another asset in order to succeed. Both assets are so highly specialized that they are dependent upon each other: one is of no use for anything else or without the other. Asset here generally refers to an intellectual property or business method, product, service, etc., which is an asset of a corporation and can be exploited by them by way of trade.

Have you experienced any competitive thinking challenges? If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?

If yes, what strategy/solution can help to solve the challenge?

2. Assimilation. Challenge of assimilation of application into the core platform, if the value propositions of each are too similar or if the application has a very attractive value proposition.

Have you experienced any assimilation challenges?
If yes, can you please shortly elaborate the circumstances?
Why is this challenge relevant for your PBE?
If yes, what strategy/solution can help to solve the challenge?

3. **Balancing competition and collaboration.** Challenge to balance competitive and collaborative behaviours between the platform owner and complementor, resistance caused by misalignment or too strongly (perceived) dominance by one of the actors.

Have you experienced any balancing competition and collaboration challenges?
If yes, can you please shortly elaborate the circumstances?
Why is this challenge relevant for your PBE?
If yes, what strategy/solution can help to solve the challenge?

4. **Dominance.** Challenge to become dominant platform.

Have you experienced any dominance challenges? If yes, can you please shortly elaborate the circumstances?
Why is this challenge relevant for your PBE?
If yes, what strategy/solution can help to solve the challenge?

Category: PBE Innovation

1. **Innovation acceptance.** Innovation acceptance related challenges not only refer to the perceived difficulty associated with the understanding and usage of the innovation but also with its accessibility and the organization of the transaction (the provided innovative product is difficult to access and the organisation of the transaction is too complex).

Have you experienced any Innovation acceptance challenges? If yes, can you please shortly elaborate the circumstances?
Why is this challenge relevant for your PBE?
If yes, what strategy/solution can help to solve the challenge?

2. **Innovation roadblock.** Challenges related to blocked innovation due to high amount of complementor connections, which create unexpected interdependencies. For example, when every update of a digital product platform can have far reaching consequences for the stability and quality of the user experience – possibly jeopardizing the integrity of the entire system – platforms become path dependent and less attractive for generating innovations.

Have you experienced any Innovation roadblock challenges? If yes, can you please shortly elaborate the circumstances?
Why is this challenge relevant for your PBE?
If yes, what strategy/solution can help to solve the challenge?

3. PBE/product innovation. Challenges related to the innovation of the core platform, its value proposition, addition of novel extensions. This includes also challenges related to the perception of the PBEs innovation state and capabilities, such as its network size, customer support quality.

Have you experienced any PBE/product innovation challenges? If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?

If yes, what strategy/solution can help to solve the challenge?

Category Architecture:

1. Interoperability. Interoperability issues related to various technologies and vendor applications.

Have you experienced any interoperability challenges?

If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?

If yes, what strategy/solution can help to solve the challenge?

2. Customization. Customization issues, such as software development on top of the platform, with positive (e.g., increased ease of use for a specific purpose) and negative (future migration /technology update complications) consequences.

Have you experienced any customization challenges?

If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?

If yes, what strategy/solution can help to solve the challenge?

3. Modularity and fragmentation. Standardized interfaces enable 3rd parties in autonomous innovation, carrying the risks of unpredictable modular evolution, fragmentation and high variation. This can endanger the user experience and overall system integrity.

Have you experienced any modularity and fragmentation challenges?

If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?

If yes, what strategy/solution can help to solve the challenge?

Interview protocol Platform Owner

Part 2

This part is designed for validation of challenges found in literature.

The challenges I have found can be seen in this framework:

I will shortly describe the challenge and ask you, whether you have experienced this challenge.

If yes, I will ask you some follow up questions.

If no, we will move on to the next challenge – in total there are 27.

Would you prefer to be able to read the questions on the screen while I read them to you?

Category: Ecosystem Governance

1. Control. Challenges related to exercising of control, the degree of control on the PBE and the effectiveness of the control, creation of conscious control mechanisms and involvement of all actors in this creation.

Have you experienced any control challenges? If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?

If yes, what strategy/solution can help to solve the challenge?

2. Coordination. The challenges related to coordination are the fact that it requires high effort such as creation of interfaces, contract design, creation of a common vision and strategy. A challenge is also adequate management of relationships between PBE actors.

Have you experienced any coordination challenges? If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?

If yes, what strategy/solution can help to solve the challenge?

3. Data Management. Challenges related to Data Governance and Management are loss of confidential information, data ownership and the rights to use it, and information asymmetry (mainly between the platform owner and the complementor).

Have you experienced any Data Management challenges? If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?

If yes, what strategy/solution can help to solve the challenge?

4. Ecosystem relations. Uncertainty about the functionality of the innovations, personal safety and privacy. Uncertainties in regard to the performance of actors. Lack of and building of trust and transparency. Actors' dependence on the PBE for income or preference to remain independent. Insufficient understanding of actor collaboration mechanisms.

Have you experienced any Ecosystem relations challenges? If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?

If yes, what strategy/solution can help to solve the challenge?

5. Effectiveness of governance. Realization of effective platform governance*.

*Effective governance occurs when an organisation has the capacity, legitimacy and authority to deliver services, regulate the economy, maintain order, collect and use revenue, and act in the good for the organisation as a whole.

Have you experienced any Effectiveness of governance challenges? If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?

If yes, what strategy/solution can help to solve the challenge?

6. Ethical challenges. Actors (in collaborative consumption) might question the morality of the PBE practices (e.g., lower wages, more time pressure, less job security, asocial working hours) or the PBE and its services might conflict with an actor's previous experience, social values, and usage patterns.

Have you experienced any Ethical challenges? If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?

If yes, what strategy/solution can help to solve the challenge?

7. Finance. Challenges related to reaching of financial viability.

Have you experienced any finance challenges? If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?

If yes, what strategy/solution can help to solve the challenge?

8. Regulatory. Issues related to piracy, data privacy and protection, physical safety, surge pricing and tariff issues. Regulatory issues also manifest with regards to better work norms and working conditions. In some cases, market dominance might prove to be a legal liability for PBEs.

Have you experienced any Regulatory challenges? If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?

If yes, what strategy/solution can help to solve the challenge?

Category: PBE Phenomena

1. Evolution. Challenges related to the ability of the complementors to adjust and coexist with the evolution of the core platform, the alignment of their goals. Challenges related to the platform owner's ability to adjust to the evolution of the ecosystem, the need to stimulate evolution.

Have you experienced any Evolution challenges? If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?

If yes, what strategy/solution can help to solve the challenge?

2. Legitimacy. Challenges related to the PBEs cognitive legitimacy*, socio-political legitimacy** or the lack thereof (such as inability to attract resources due to PBEs newness or problems with fitting into the industry relations).

*Cognitive legitimacy refers to “knowledge about the new activity and what is needed to succeed in an industry”

**Socio-political legitimacy refers to the “the value placed on an activity by cultural norms and political authorities”

Have you experienced any Legitimacy challenges? If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?

If yes, what strategy/solution can help to solve the challenge?

3. Platform dynamics. Challenges related to the lock-in phenomenon*, and platform openness**.

*The ways in which a platform can make it more desirable for existing adopters to not jump ship to a rival

**the level of how easy/difficult it is for an actor to join or exit a platform

Have you experienced any Platform dynamics challenges? If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?

If yes, what strategy/solution can help to solve the challenge?

4. Platform properties. Challenges related to network effects* (positive or negative) and multi-homing**.

*A property of a technology solution where every additional user makes it more valuable to every other user on the same side (same-side network effects) or the other side (cross-side network effects)

**When a participant on either side participates in more than one platform ecosystem

Have you experienced any Platform properties challenges? If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?

If yes, what strategy/solution can help to solve the challenge?

5. Platform start-up phenomena. Challenges related to the "chicken and egg"* problem, lack of adoption and problems of assembly of initial membership. Further challenges are related to the need for awareness of the PBE and various collaborations and finding adequate partners for it.

*The dilemma that neither side will find a two-sided technology solution with potential network effects attractive enough to join without a large presence of the other side

Have you experienced any Platform start-up phenomena challenges? If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?
If yes, what strategy/solution can help to solve the challenge?

Category: Competition

1. Competitive thinking. Competitive thinking as challenge during formation of PBE and resistance from other ecosystem members against development of co-specialized* assets.

*An asset is said to be cospecialized when it relies upon another asset in order to succeed. Both assets are so highly specialized that they are dependent upon each other: one is of no use for anything else or without the other. Asset here generally refers to an intellectual property or business method, product, service, etc., which is an asset of a corporation and can be exploited by them by way of trade.

Have you experienced any competitive thinking challenges? If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?
If yes, what strategy/solution can help to solve the challenge?

2. Assimilation. Challenge of assimilation of application into the core platform, if the value propositions of each are too similar or if the application has a very attractive value proposition.

Have you experienced any assimilation challenges?
If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?
If yes, what strategy/solution can help to solve the challenge?

3. Balancing competition and collaboration. Challenge to balance competitive and collaborative behaviours between the platform owner and complementor, resistance caused by misalignment or too strongly (perceived) dominance by one of the actors.

Have you experienced any balancing competition and collaboration challenges?
If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?
If yes, what strategy/solution can help to solve the challenge?

4. Dominance. Challenge to become dominant platform.

Have you experienced any dominance challenges? If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?
If yes, what strategy/solution can help to solve the challenge?

Category: Specifics of business model

1. User organizations. Challenges related to the PBE application in User Organizations: technology use inertia, platform management in the organization and the challenge to develop the correct options.

Have you experienced any User organizations challenges? If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?

If yes, what strategy/solution can help to solve the challenge?

50min

2. Collaborative Consumption. Challenges related specifically to collaborative consumption business model, such as refusal of actors to participate, the contamination barrier*, the image barrier** and the responsibility barrier***. Additionally, also challenges related to conflicts of interest created by offering services/products already offered by the (local) government.

*Customers and peer service providers may experience contamination concerns about the assets being shared in collaborative consumption because these assets have (or are likely to) come in physical contacts with previous customers and/or the peer service provider who owns the assets.

**This barrier refers to unfavourable associations regarding the platform provider's brand, the innovation category, and one's own brand.

***The responsibility barrier refers to actors concerns about being held responsible for their own or other actors' usage of the innovation or of the shared assets.

Have you experienced any Collaborative Consumption challenges? If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?

If yes, what strategy/solution can help to solve the challenge?

3. Local challenges. Challenges related to a specific local situation: low technology penetration level, inadequate infrastructure, low level of disposable income.

Have you experienced any Local challenges? If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?

If yes, what strategy/solution can help to solve the challenge?

4. Market dynamics. Challenges related to the high dynamism and unpredictability of the market of the PBE.

Have you experienced any Market dynamics challenges? If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?

If yes, what strategy/solution can help to solve the challenge?

Category: PBE Innovation

1. Innovation acceptance. Innovation acceptance related challenges not only refer to the perceived difficulty associated with the understanding and usage of the innovation but also with its accessibility and the organization of the transaction (the provided innovative product is difficult to access and the organisation of the transaction is too complex).

Have you experienced any Innovation acceptance challenges? If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?

If yes, what strategy/solution can help to solve the challenge?

2. Innovation roadblock. Challenges related to blocked innovation due to high amount of complementor connections, which create unexpected interdependencies. For example, when every update of a digital product platform can have far reaching consequences for the stability and quality of the user experience – possibly jeopardizing the integrity of the entire system – platforms become path dependent and less attractive for generating innovations.

Have you experienced any Innovation roadblock challenges? If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?

If yes, what strategy/solution can help to solve the challenge?

3. PBE/product innovation. Challenges related to the innovation of the core platform, its value proposition, addition of novel extensions. This includes also challenges related to the perception of the PBEs innovation state and capabilities, such as its network size, customer support quality.

Have you experienced any PBE/product innovation challenges? If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?

If yes, what strategy/solution can help to solve the challenge?

Category: Architecture

1. Interoperability. Interoperability issues related to various technologies and vendor applications.

Have you experienced any interoperability challenges?

If yes, can you please shortly elaborate the circumstances?

Why is this challenge relevant for your PBE?

If yes, what strategy/solution can help to solve the challenge?

2. Customization. Customization issues, such as software development on top of the platform, with positive (e.g., increased ease of use for a specific purpose) and negative (future migration /technology update complications) consequences.

Have you experienced any customization challenges?

If yes, can you please shortly elaborate the circumstances?
Why is this challenge relevant for your PBE?
If yes, what strategy/solution can help to solve the challenge?

3. Modularity and fragmentation. Standardized interfaces enable 3rd parties in autonomous innovation, carrying the risks of unpredictable modular evolution, fragmentation and high variation. This can endanger the user experience and overall system integrity.

Have you experienced any modularity and fragmentation challenges?
If yes, can you please shortly elaborate the circumstances?
Why is this challenge relevant for your PBE?
If yes, what strategy/solution can help to solve the challenge?

Appendix 5: SLR template data extraction and quality assessment

Data extraction table, for quality assessment moderate till well is the acceptable range.

The following data was extracted: Author reference, Study design, Research question/aim, Key findings, PBE type, Maturity of PBE, Identified challenges and context, Perspective (actor, technical, new?).

Data Extraction				Quality			
				Qualitative			
Article Nr.	Study design	Research question/aim	Key findings	How defensible is the research design?	How well was data collection carried out?	How clear are the links between data, interpretation and conclusions – i.e. how well can the route to any conclusions be seen?	How adequately has the research process been documented?

Appendix 6: Interview data extraction table

Nr. Item	Interview identifier	Date	Role	Status	Assigned category	Assigned subcategory	Identified challenge	Data excerpt	Proposed solution	Relevance of the challenge for the PBE environment and related reasoning

Appendix 7: Interview data extraction

Role	Status	Assigned category	Assigned	Identified challenges (Fitting subcategory)	Data excerpt	Proposed solution	Relevance of the challenge for the PBE environment and related reasoning
User	Refinement	Architecture	Interoperability	Inter-application data synchronization (within PBE and also between different applications)	<p>Probably because of the projects that I'm working on, but things like - the data values available and field names - making sure that those are synced and then mapped correctly. Because in many cases, if those are not synced and mapped, then there's lots of errors and you can't move forward.</p> <p>Liva: Synced and map between different applications?</p> <p>U2BU: Yeah, between the applications. I think that's a really big one that I have to fight with a lot. There could be bigger ones, but that's one that I'm often in the weeds trying to figure out.</p>		

User				Educating users on solution, training	I think we have a big issue; it is training. It's because everything changes so fast and quickly, right? You know we're always asked for documentation or information, but as soon as you read the documentation - it's changed. So, keeping up a sort of support structure for the ever changing pieces of improvement. Because I always want to assume that people are doing things for the right reasons, right? As much as I can get frustrated about something, at the end of the day I don't think people are trying to be malicious, especially in things like software. Not for our group, not for the kind of people that we're working with. They are frustrating because they're always changing, but there's a reason, and likely the reason is very positive for needing to change. But having to keep up with that from a perspective of: "let's train 1000 users", or even if it's 100 users who are using that specific functionality, that's challenging. I don't know if that's captured in it, but if people can't use the system we put in place, then what's the point? So, it is a big problem because we can put a solution to supposedly fix it, but if humans can't understand what that is, then it's not actually solving the problem. Unless it's fully automated, which in this case it's not. We have humans interacting with systems in different parts of the system, the communication and training and documentation needs to be there, and that's extremely challenging.	I don't know. Now my imagination goes into different directions, but if there was a sort of artificial intelligence or a robot situation, which I believe are all around us all the time now and trying to help us, I think that those things can help solve this. We're just not using them in that way right now. We're not deploying them in a way that will do that. I think we're using it to for example, when you're shopping for something online, its watching all of your clicks and then in many cases prompting - this is a product that's related, or whatever. Or - maybe you should look at this. So instead of it prompting in that way, maybe as you are clicking, it is learning what users, who are of a specific role, are doing all the time and then can make suggestions of: "oh, I see that you're sitting at this opportunity trying to figure out what to do next. Hey, have you done this yet?" And I think that those things that are coming out, they are very manual now. I have something right now on opportunity that's called predictive scoring, and what it is doing, it's using
Refinement						
PBE Innovation						
Innovation acceptance and adoption						

						<p>artificial intelligence to try to tell you what's the likelihood of you winning this opportunity based on historical information. But I think of it as one more level, from a training perspective - it's seeing how people flow through the form. It's then learning, learning, learning and then it says – OK, here's what most people should do next, right? So, if you have 70% of your people trained or using it because they've been experienced users, then for new people or the 30% that needs help, because people are doing it in a certain way 70% of the time, then can't you prompt them and say: "Here's what you should do?" or "Here are a few other next things that you can do in the system." I don't see why not. I think that it is possible. I think we have to think outside of our box and into other people's boxes and then bring that knowledge and thinking back into the box that we want it to work in. Because I think all of these things are possible and you know it's beyond my brain capacity. Although I try to stay open to the idea that its possible. So, I</p>	
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						<p>do think it's possible to help improve it dramatically actually. Liva: Yeah, if you describe it like this. I mean, no one does something extraordinary in CRM. Probably everyone does the same things again and again. U2BU: Yeah, or should be. We should be guiding it and we should be coming with best ways to work. And if you can establish what the best ways to work are, then OK, let's deploy this artificial intelligence to learn to learn, learn, learn, learn, and then start prompting people. So, I think it's possible.</p>	
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User							
SLR							
Specifics of business model							
User organizations							
Technology use inertia				<p>Yes, all the time.</p> <p>So, I think technology use inertia... Our users are not just using this to do their job right? I mean that's part of it, that we always need to keep in mind, that I think people forget about often. Every time we change something, it's challenging because this is not the focus of their job. It's only part of their job and in some cases a very small part of their job. So, to change from what they're used to or and or typically doing is challenging, so it is with practically everything. Even if they don't like it, it's still challenging when we fix it - to tell them to do something different. That's already challenging, even if it's better. Because you're used to doing what you were doing. So, you can complain, complain, complain, complain, complain. We fix it - you still complain, because now you have to do something different and the darn field is someplace else. Even if it's the same number of clicks. All the time. Do you need more examples on that one, or does that make sense?</p>		<p>So oftentimes I'm realizing, I'm brought in to fix projects that went sideways. A way that I can successfully fix projects that went sideways is - prioritize what things are the most painful first. And if and where possible, fix those items quickly rather than saving them all up to do another big deployment, which is very hard for people to digest. It's more about doing it in digestible chunks.</p> <p>Of course, communicating and giving people a heads up, finding the right people to communicate your message, I think is a really big thing.</p>	<p>Yes, it happens at every deployment. Yeah, this is constantly happening, because we're deploying every two weeks. So, in some way, shape or form, it's affecting someone, or at least a small group of people. And in some cases when big projects are rolled out, that's a big group of people. We do one every February because it's GCM. And we just rolled out a big project for that. So that's big change. And that is a big impact on our users.</p>

User	NEW	Specifics of business model	User organizations	Accommodati on of different use cases within user organization	<p>U2BU: Yes, that they are not consistent globally. For example, how our sales teams are structured is not the same globally. We see this with semiconductor versus material science, life science versus VSG, versus XPS. The structure or the organizations of those teams are different, but the system has a really hard time supporting that. So, we say: "Everyone, you have to work in this certain way!" And we try to do that. And that's a huge challenge. Liva: Yeah, then the CRM itself has a specific structure embedded in it for us as a user organization, but it cannot differentiate between different types of structures within our organization. Is that what you are saying?</p> <p>U2BU: Right. It's tricky because there are certain things that we are doing to try to make people's life easier by making many, many assumptions and then putting things like defaults in. Anything that's a default is assuming that you're going to work in a certain way. All those defaults are trying to do, is make the experience in the software more efficient. And because it's different in different groups, it's really hard to figure out what are the right defaults to do globally. They're not always true.</p>	<p>I guess I'd look at the problem, it takes a lot of analysis and understanding. What is the 80%? What is the 20% of that problem and is there anything that we can do to bridge from the 20 to the 80 or the 80 to the 20. I don't know, and it's the most challenging piece, is that if you have the 20% that's trying to grow into a bigger chunk... How do you make that case? Because, of course, they're trying to get bigger too, right? So, in sales, you're selling into a new market, for example. That market looks tiny, so we're not doing anything to support them, but they're trying to grow. So how do we support that growth or their potential? How do we support a potential when you have groups that are actually performing in a space? That becomes challenging too. But how do I solve it? Roll my sleeves up. It's just like really understanding the detail. Gosh, that's a hard question to answer from a general perspective.</p>
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User							
Refinement							
Specifics of business model							
Local challenges							
Unfriendly infrastructure				<p>So, what about our agents and distributors? We have way less control of their environment and the way that they are accessing CRM. So, I don't know if this applies. It's not necessarily their personal income, but it could be the infrastructure that they are in... I'll use the example of China. Our users in China have... I don't think that it is inadequate infrastructure, it's just infrastructure that does not work in a friendly way with CRM.</p> <p>Liva: OK, so you do notice this challenge, so could you then perhaps give me a little bit more background of what type of problems you've experienced that the agents or the users in China have?</p> <p>U2BU: Yeah, so a lot of it is connectivity, not being able to do their job. Forms don't load or proposals don't generate, or data doesn't show up. I don't know if it's bandwidth or firewalls. A lot of times people from IT have to step in and work with the local IT in China or in Southeast Asia, or in Middle East, UAE. Countries in those spaces. It's the infrastructure from IT that needs to deal with that. So, users will write to us and say: here's our screen. And then I'm like: "I've never seen that before!" And then IT has to get involved.</p>			<p>Liva: Yeah, the relevance of the challenge? I see it as part of our organization can't do their job basically, so it's it has a big impact on a part of users.</p> <p>U2BU: Yes</p>

User	SLR	Specifics of business model	Market dynamics	<p>Disruption due to PBE market dynamics</p> <p>U2BU: So, I think this is relevant maybe. This has to do with the idea that we are in the cloud. And you know, patches or releases just get rolled out at any odd time. We don't in some cases have a choice. We just have to accept that what Microsoft is pushing out is what we have to deal with. And part of that is maybe because Microsoft is being challenged by other like Salesforce.com, which is a big competitor of Dynamics 365. They are putting out a new whatever functionality. So, then the market is meaning the space that Dynamics is swimming in, is influenced by this new feature or functionality, and so then they push out something in response. And I think the other thing is - for all the products that are plugins to Microsoft, they're always competitors. And I'm sure that there are distractions because of that, I think we largely ignore them, so maybe the relevance is very small, but it is there. Because for me market dynamics translates to competition and there's always competition in this space. Whether or not we pay attention is a different. And then it causes a distraction and or disruption.</p> <p>Liva: So, the challenge that you experience in relation to this subcategory would be that there are disruptive releases coming from the platform owner because of situation changes in the market?</p> <p>U2BU: Possibly, and that's something that I don't know, but I think it's relevant to mention as part of this. It's light on my part, because I'm not under the hood as much as our IT team is, but it does affect us. Things definitely affect us when there's a release of some sort, and I don't know the root cause of the release, but I wouldn't just close the door on the fact that those exist and they cause challenges, of which I definitely cannot solve.</p>	<p>And I'm sure that there are distractions because of that, I think we largely ignore them, so maybe the relevance is very small, but it is there.</p>
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User	SLR	Architecture	Customization	Customization	<p>U2BU: Yes, I think it's lightly relevant too, because there is a reason why we have so many lines of custom code - is because Microsoft has a prescribed way of using their system and we have so many resources and custom pieces to deviate from what Microsoft has made available. If you were to just open up a demo of Microsoft Dynamics , it is going to look so different than what you see when you open up our instance of Microsoft Dynamics.</p> <p>Liva: Yeah, how would you define the challenge then? Is the control too strong for your feeling?</p> <p>U2BU: I don't know that it's too strong, it's just what's challenging is, that every time there is a release of some sort of - a patch fix or whatever - if anything is touching that, pieces of code go missing, or they disconnect. I mean we face this all the time. Every time Microsoft rolls something out it affects us. I can speak to that, we experience it because it's with the patches that are rolled out, that happen twice a year. I think October and April, so we have one probably coming up very soon. Yeah, where they deploy things that fix things, but fix the out of the box things and we are - I don't even know what we're using that's out of the box - because of our customization this really affects us. This has to do with because we have customizations and now, we are in the cloud, so we don't control what things come to us or not, they appear, and we have to deal with them.</p>	<p>everything is changed, right? So, you come on the cloud, it looks all different - I don't know what was better. I think we are trying to undo some of our customizations and take advantage of as many out-of-the-box solutions, as we can. But that is a very tedious process. I think IT is trying to do that where they can, so where a new functionality comes out that can replace something that we had a customization for in the past - they're trying to change us over. And I think that's honestly the best you can do, unless you were to stop everything. You know, stop all changes for an entire year. And the only changes you can do are going from current to out-of-the-box. This is not a realistic solution.</p>	<p>Yes, I think it's lightly relevant too, because there is a reason why we have so many lines of custom code</p>
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User	SLR	Ecosystem Governance	Control	Control	<p>U2BU: Yes, I think it's lightly relevant too, because there is a reason why we have so many lines of custom code - is because Microsoft has a prescribed way of using their system and we have so many resources an custom pieces to deviate from what Microsoft has made available. If you were to just open up a demo of Microsoft Dynamics , it is going to look so different than what you see when you open up our instance of Microsoft Dynamics.</p> <p>Liva: Yeah, how would you define the challenge then? Is the control too strong for your feeling?</p> <p>U2BU: I don't know that it's too strong, it's just what's challenging is, that every time there is a release of some sort of - a patch fix or whatever - if anything is touching that, pieces of code go missing, or they disconnect. I mean we face this all the time. Every time Microsoft rolls something out it affects us. I can speak to that, we experience it because it's with the patches that are rolled out, that happen twice a year. I think October and April, so we have one probably coming up very soon. Yeah, where they deploy things that fix things, but fix the out of the box things and we are - I don't even know what we're using that's out of the box - because of our customization this really affects us. This has to do with because we have customizations and now we are in the cloud, so we don't control what things come to us or not, they appear, and we have to deal with them.</p>		<p>Yes, I think it's lightly relevant too, because there is a reason why we have so many lines of custom code - is because Microsoft has a prescribed way of using their system</p>
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User	SLR	Ecosystem Governance	Coordination	Coordination	<p>U2BU: Yeah, I think that this is really related, and that's why they're in the same category of question one in this category. And I'm so far removed from what Microsoft is doing and what their strategies are. We are so far removed from what the common vision and strategy of Microsoft is.</p> <p>Liva: Yeah, I think if you feel it doesn't touch you, just say next.</p> <p>U2BU: It only touches us because of the stuff that they roll out and the fact that we have to do customizations. So those two for me are very related. We have all the customizations because the strategy is not meeting our needs. Maybe the vision is in the right direction, and I think so - that's why we are using this solution. But the strategy in which they try to solve the problem may be different. And so, it's why we have so many customizations.</p>		
User	SLR	Ecosystem Governance	Coordination	Coordination	<p>U2BU: It's hard to fit all these problems in the different boxes, even though the boxes are quite big. I don't know how to say that because I think they're all related. The coordination of it matters because when they roll the patch - we don't have a choice. We can know the plan, that's all we know, but from coordinating how we react to that... Yeah, I don't know.</p>		. The coordination of it matters because when they roll the patch - we don't have a choice.
User	NEW	Specifics of business model	User	Insufficient resources to comply with coordinated change	<p>U2BU: I think that's a matter of opinion. I think that Microsoft, like many companies, try to communicate what's coming out, so they try to coordinate, they send out information about this. It's that I don't think we have enough resources to really, with a fine comb, go through what that actually means for us. So, I think from a coordination perspective Microsoft is trying to do that. I think we are having a hard time keeping up with that.</p>		

User	SLR	Ecosystem Governance	Data Management	Rights to use data	<p>U2BU: Yes. I'll start with the very beginning, with Eloqua. It is managing the customer facing activities. Things like GDPR, that's a big deal. Managing that globally, it's different in different countries. That's one challenge, I don't know if it falls in this category. I'm just kind of talking out loud.</p> <p>Liva: How does it affect you?</p> <p>U2BU: It affects me because in CRM account managers can create a mailing list. A lot of users can create an email list. Thank God they don't really know how to do that, because we could be in a lot more trouble. But it's stuff like that, like making sure that people who can pull data, especially contact information, are aware of what kind of contact they can make to customers. That's a huge deal. We can get in a lot of trouble if we break that trust. If someone checks the checkbox that says: "Do not contact me" and someone forgets to query the field that says this - we could get in trouble. We could be mistakenly marketing to them, inadvertently. That's one of the challenges. And its relevance for us in our ecosystem.</p>	<p>U2BU: I mean, a lot of it- could be resources, right? A lot of it is that we don't have enough people to focus on managing this and keeping it clean and straight. A lot of it comes down to resources I think. To put a proper solution in place, I think we just need resources.</p>	
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User	SLR	Specifics of business model	User organizations	Platform management within organization	<p>The challenge is that management is often changing the way they do the analytics. You know something is important this quarter, and then next quarter this new thing is important. Well, we don't have the data on that because it's not a required field. There's existing data that may need to be updated and that already is there... So what do we do from data migration? What do we do from a point of making sure that the newly required fields have information in it? We just changed the business unit classifications that we're doing in CRM and that's huge in regard to maintaining order. And just trying to solve that is a tremendous effort.</p>	<p>U2BU: You know, more people (laughing). This is going to always be a challenge. And I'm happy to be in a world and in a business where it is always changing. That's what makes it exciting sometimes. Sometimes terrible, but most times exciting. You know, build a flexible system, but I don't know how to. I think we try our best to do that, but if it's too flexible, we have no way to maintain order. Part of this is maintaining order, I agree with that. And it's really hard to do that if how people are doing analysis is changing all the time, which is fair. I don't know. I don't know...</p>	
User	NEW	Ecosystem Governance	Ethical challenges	Using data stream to monitor users	<p>U2BU: Yeah, I think that time tracking thing, where it's saying - this amount of time you're spending on doing something. For a while they were trying to figure out how could they track the number of activities an account manager was doing and having the account managers log all the activities associated to a specific opportunity. Those kinds of things. For some, I think they really felt the whole Big Brother thing. I mean, the whole comment, that whole thing falls into this space for me.</p>		

User	NEW	PBE Phenomena	Evolution	Platform evolution as challenge in certain conditions	<p>I think it goes back to the other question, where we were talking about requirements. And ever changing rate, because evolution comes in this situation because people need something to do something a certain way. Or think they need something to do something a certain way. So then Microsoft says, OK, we're getting lots of requests that are in this direction or in the same way, because now users are using it in this way or the other way. If the way we are working are not in the same way as the majority of people are using the system, then we are affected by the change that gets pushed to us. Because of the bigger way of working. Which then leads to more customizations. Yeah, but I don't know if that's part of it.</p> <p>Liva: But do you experience this challenge? So, is it something that's happening?</p> <p>U2BU: I think it is, and that's why we're doing customizations. So, our solution to this is customization. If something is not available then we ask our developers to then customize a solution for us.</p>	<p>U2BU: You know, try to go more with the out-of-the-box solutions, as I think we're trying to do. I think moving in that direction, moving more in line with how other companies are doing it. And/or gaining a better relationship with Microsoft would be another way to solve it. Get the ear of whoever's choosing or prioritizing these changes. And do it that way. That would be another way.</p> <p>Or pay more money I guess. I mean you can always pay more money and then things suddenly get fixed. It's so strange (laughing). That would be my solution to all of this.</p>	<p>U2BU: It can reduce the amount of efficiency or slow things down. Because if something changes and this happens, you know when patches are rolled out, or when there's a big update of some sort, again October and April... If we are not in line with the rest of the way that other groups of users or customers are using the system and/or we have a tremendous amount of customization than any system change, or platform change will affect us.</p> <p>Liva: So, it ripples out and creates more and more work to keep the customizations working.</p> <p>U2BU: Correct, and then in some cases if things break, the resources that we would be using to do enhancements then have to be used to fix the things that maybe were affected or went broken due to the evolution of the system.</p>
User	Refinement	PBE Phenomena	Platform startup phenomena	Startup problems for particular functionality	<p>Maybe one example would be the outlook client, so that is something that is available, it's not required. Choosing to use the outlook client can happen anytime and in account mainly sales, sometimes others like SSOC also choose to use it, and again it comes to that situation where you could be more efficient if you use it and others around you are using it as well. Because with all other things people don't have a choice. This one piece you have a choice to either have or not have, depending on how you want to work. Yeah, so that's why I think about this one part of the ecosystem is because it's a part that people do have the choice to, you know have or not. Is that related to this? Uhm?</p>		

User	SLR	Specifics of business	User	Development of correct options	First of all, we moved CRM into the cloud, which we shouldn't have done		
User	SLR	Architecture	Customization	Customization	and now we are customizing at a pace that is unheard of, which we shouldn't do either.		
User	SLR	Ecosystem Governance	Control	PBE gains complete control	And then the other thought is that in the cloud you don't have control over what Microsoft does. So, in the beginning, we moved into the cloud. That meant that all our data went into the cloud. Yeah, tricky, but OK, I can live with that. But now the second step was to move the program itself also into the cloud. So that means that they have an on-premise version where it's hosted on our own service and they have a cloud version that is hosted somewhere in the cloud. And Microsoft has utter control over their cloud version. We don't have anything to do. And what they are doing is periodically and regularly make changes to the cloud version. They have a major upgrade twice a year. They come with documents that support what they're going to do, but because our instance is so heavily customized, we have the danger that they will flick a switch somewhere which will have an effect, not here in the program, but somewhere else in the program. And you would say it has an effect there, but after a while, you find out that something is happening somewhere else too. That's a big issue		

User	SLR	Specifics of business model	User organizations	Development of correct options	<p>And then the other thought is that in the cloud you don't have control over what Microsoft does. So, in the beginning, we moved into the cloud. That meant that all our data went into the cloud. Yeah, tricky, but OK, I can live with that. But now the second step was to move the program itself also into the cloud. So that means that they have an on-premise version where it's hosted on our own service and they have a cloud version that is hosted somewhere in the cloud. And Microsoft has utter control over their cloud version. We don't have anything to do. And what they are doing is periodically and regularly make changes to the cloud version. They have a major upgrade twice a year. They come with documents that support what they're going to do, but because our instance is so heavily customized, we have the danger that they will flick a switch somewhere which will have an effect, not here in the program, but somewhere else in the program. And you would say it has an effect there, but after a while, you find out that something is happening somewhere else too. That's a big issue. Over the last two years, I'm seeing a lot of weird stuff in CRM where there's like we say, Gremlins in the system. Something is happening and you don't know where it comes from. You turn a knob here and there something falls over where there's no apparent connection, but still, it falls over. I've been warning IT for 5-6 years now that they should take care, that they don't overdo it and they don't listen of course.</p>		
User	SLR	Architecture	Customization	Customization	<p>but because our instance is so heavily customized, we have the danger that they will flick a switch somewhere which will have an effect, not here in the program, but somewhere else in the program. And you would say it has an effect there, but after a while, you find out that something is happening somewhere else too. That's a big issue. Over the last two years, I'm seeing a lot of weird stuff in CRM where there's like we say, Gremlins in the system. Something is happening and you don't know where it comes from. You turn a knob here and there something falls over where there's no apparent connection, but still, it falls over.</p>		That's a big issue.

User	SLR	Architecture	Customization	Customization	<p>And it's this complexity because of all of our customizations, which are almost impossible to manage because we make it so big and we drag everything of the whole company into CRM, which I think we shouldn't do.</p>	<p>U3BU: It is very complex and I'm not sure whether I could even solve it, but I have a feeling that it would be very wise to stop customizing for a year or so. Last year, two years ago when my previous manager was there we had a code freeze for a few months where he said we can only update tickets and do break fixes and stuff. But I have a feeling that that's not good enough. And of course, it's just a dream because it will never happen, such a solution.</p> <p>Liva: What would it achieve? Because I don't understand it maybe.</p> <p>U3BU: Well first of all, you could figure out where the instability comes from. If you keep changing that ecosystem, it is going to be very, very tricky to figure out what the source of all mystery is.</p>	<p>The robustness of this whole system is directly affected by the level of complexity.</p>
User	SLR	Ecosystem	Control	Control	<p>Then secondly, Microsoft has these periodic upgrades, but you don't know what they're doing behind scenes. And there have been incidents where it was clear that Microsoft had changed something on their server, and we ran into problems.</p>		

User	SLR	Specifics of business model	User organizations	Platform management within organization	<p>For example, I'm experiencing now with a business line, so we're trying to integrate them into CRM, and as you know the factory wants one part number to be ordered. And sales would like to have something that they can configure. Now that's a conflict of interest and now it's up to us to solve that to make sure that all of that works. That's a user organization challenge to me. And we have those on "de lopende band" (laughing).</p>	<p>U3BU: I think I'm going to say most of the time the same answer - stop customizing, because every time you bring changes into the system, it will affect different and new groups. If the complexity keeps increasing, that's something you can never avoid. So, stop customizing, then you have a good handle there to stop all these interactions and challenges.</p>	<p>It depends of course, on the magnitude of the challenge. Sometimes it's like we've solved it very quickly and at other times it really takes long discussions. And with this business line example, I had that in a meeting this morning - I've escalated the fact that I can't satisfy both sales and factory and something needs to happen. That can take weeks before there's a final decision. They can be very impactful.</p>
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User						
SLR						
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Customization					<p>I have one other example which is playing right now. So little bit of history. We are selling a product. Perhaps you've heard of it, it's a different electron source for our systems, and that product has a different number of years of standard warranty. Normally everything has a one-year standard warranty, and this gets five years of standard warranty. This has an impact on the service contract that we are selling. Now we are being asked to fix it so that the service contract price doesn't consider the price of the product in the first five years of extended warranty. Normally we would rule out the first year, but now we have to rule out five years. I can build it, I need to model that in the Configurator, but the complexity is the fact that I've built it in such a way that the service contract price is calculated and then an additional 3% is added over the years each year, and then everything is ended up. So, what I'm doing, and I call it indexation, every year the price increases by 3%, I do that indexation on the total configuration and not on the individual items that contribute to that price. Now to leave this out, it would be most elegant if I had it on the individual elements, but I don't, because this requirement didn't exist when I built it in the first place. And so now I have a real challenge (laughing) to build this in, and basically, they're asking me to reprogram the whole thing. Now that's a conflict of interest because we have these parties who find it utterly important that the customer doesn't get charged too much for a service contract. Then we have service who says, well, we don't care because it's a mess anyway, so why would we look at it? And then in the middle, we have the CRM ticketing "bureau" who is adamant and says you have to fix all of this. And now I'm finding out that service finance is not interested. The BU makes a big problem out of it and I'm in the middle. I'm telling them I can do it, but it's going to take me at least three, four weeks for just this single ticket, which is only a small portion of our business. What are we doing? And yeah, and that's the type of challenges that I keep encountering all the time.</p>	

User	NEW	Specifics of business model	User organizations	Conflict of interest within user organization on how a solution should look	<p>I have one other example which is playing right now. So little bit of history. We are selling a product. Perhaps you've heard of it, it's a different electron source for our systems, and that product has a different number of years of standard warranty. Normally everything has a one-year standard warranty, and this gets five years of standard warranty. This has an impact on the service contract that we are selling. Now we are being asked to fix it so that the service contract price doesn't consider the price of the product in the first five years of extended warranty. Normally we would rule out the first year, but now we have to rule out five years. I can build it, I need to model that in the Configurator, but the complexity is the fact that I've built it in such a way that the service contract price is calculated and then an additional 3% is added over the years each year, and then everything is ended up. So, what I'm doing, and I call it indexation, every year the price increases by 3%, I do that indexation on the total configuration and not on the individual items that contribute to that price. Now to leave this out, it would be most elegant if I had it on the individual elements, but I don't, because this requirement didn't exist when I built it in the first place. And so now I have a real challenge (laughing) to build this in, and basically, they're asking me to reprogram the whole thing. Now that's a conflict of interest because we have these parties who find it utterly important that the customer doesn't get charged too much for a service contract. Then we have service who says, well, we don't care because it's a mess anyway, so why would we look at it? And then in the middle, we have the CRM ticketing "bureau" who is adamant and says you have to fix all of this. And now I'm finding out that service finance is not interested. The BU makes a big problem out of it and I'm in the middle. I'm telling them I can do it, but it's going to take me at least three, four weeks for just this single ticket, which is only a small portion of our business. What are we doing? And yeah, and that's the type of challenges that I keep encountering all the time.</p>		
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User	SLR	Specifics of business model	Local challenges	Inadequate infrastructure	<p>Yeah, so we have met those challenges and are seeing those sometimes. For example, there is a problem in China where there's a low speed of the system. People are complaining that they are waiting for hours and hours, and hours and then I don't know whether IT mentioned it, but there was a problem with the Chinese government monitoring all the traffic and what have you. And because of that CRM became very, very slow. They found a solution for that via VPN or something like that. I don't know what the exact solution is, but there was something where there were indeed local challenges. And all the challenges might be that the distributors need access to the system as well. Nowadays it's arranged a bit better, but we've seen challenges where they had difficulties getting into the system and where we had to solve something where they could not go into the system fully but still had to see parts of it. This is all being arranged for better now.</p>	<p>Well, I'm not necessarily sure you can avoid all these challenges, and sometimes you just have to dig through the mud in order to get to the clean side of the heap. Sometimes you just have to do it. It's not always about avoiding it, it's sometimes it's just you have to find the shortest route to the other end of the tunnel.</p>	
User	SLR	Specifics of business model	User organizations	Technology use inertia	<p>We have other challenges for a particular business line. The American and German guys are in the system, right? And they are refusing to do the opportunities in a proper way. So that's not necessarily a technical challenge, but it's more like a personal challenge or cultural challenge, or I don't know how you want to call it. If they do not cooperate fully and if the organization doesn't hammer that it's important, then you get challenges where the pipeline is not filled according to the wishes of the pipeline managers. You get incomplete data.</p>		

User	Refinement	Ecosystem Governance	Control	Shift of control within user organization	<p>So, let me give you an example that exemplifies what I just stated. Over the course of the last two years we had our ticket calls weekly. That was something that was organized by the CRM support team. We were in the driving seat and over the course of the last two years that has been turned around and it's now completely in the hands of IT and I find it very disturbing development. Well, I'm not going into all the details right now. Perhaps we will encounter them later on automatically. But the thing is that IT is now controlling it much further than I find healthy. Let's put it that way. Two years ago, we did a project for XPS. You were there . IT almost blocked it going live, I find that interference almost appalling, how is that possible? How can they decide what the business needs and what it should look like?</p>		
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User							
SLR							
Ecosystem Governance							
Control							
Control					<p>Now I'm thinking. No, it's not necessarily that it's bad that we lose control. What is bad is the fact that they are not as communicative as they should be in order to keep the control being exercised in the right way. And I don't care who has the control, just as long as there's good communication and there's good agreement on when changes in their control are affected or effectuated, or whatever.</p>		
							<p>Tremendous impact, if they do whatever they want without consulting us, and it can have very far-fetching situations. Particularly at the end of the quarter, when there's already so much stress in the organization, and when that happens, then I'm not going to say we're doomed, but I think we put ourselves in the hands of an organization that is not caring as much about our business the way we are caring about our business. That can have a very large impact.</p>

User	NEW	PBE Phenomena	Evolution	User organization challenge to keep up with PBE growth	<p>I think if you have an on-premise instance of Microsoft Dynamics - you are also locked in in a way because you're always at the mercy of what the vendor does with this program. There's no escape from that, but you can decide for yourself to stay on that older version for a longer time. Microsoft now says - every half year you get an update. And that has to be implemented. We turn it on, whether you like it or not, after a year. So you have one year to adjust. That's fantastic, then you're all screwed up if you haven't followed, or if you haven't seen everything that needs to be seen. Last week in the ticket call Ashlesha said that there is such a wave, they call that waves - it's more like a tsunami, but they call it a wave, and you're really at the mercy of Microsoft and she told us that the document that describes all the changes is so huge that they hardly have any time to absorb it, let alone understand what the implications will be for our set up. That scared the shit out for me. That's even worse than I figured.</p>		
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User	SLR	PBE Phenomena	Platform dynamics	Locked in	<p>I think if you have an on-premise instance of Microsoft Dynamics - you are also locked in in a way because you're always at the mercy of what the vendor does with this program. There's no escape from that, but you can decide for yourself to stay on that older version for a longer time. Microsoft now says - every half year you get an update. And that has to be implemented. We turn it on, whether you like it or not, after a year. So you have one year to adjust. That's fantastic, then you're all screwed up if you haven't followed, or if you haven't seen everything that needs to be seen. Last week in the ticket call Ashlesha said that there is such a wave, they call that waves - it's more like a tsunami, but they call it a wave, and you're really at the mercy of Microsoft and she told us that the document that describes all the changes is so huge that they hardly have any time to absorb it, let alone understand what the implications will be for our set up. That scared the shit out for me. That's even worse than I figured.</p>		
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User	SLR	Specifics of business model	User organizations	Development of correct options	<p>Yeah, so for me the governance of this ecosystem internally would be IT. And that's the main governance factor. There's also of course interaction with sales and other parties, and then together they determine what it should be and how it should be governed. But in the end, the real governance is in the hands of IT. They make sometimes wrong choices, so there are challenges related to that. Wrong choices - don't get me wrong; they make choices that may not be so beneficial to the organization as they seem to be. For example, from my perspective, one of those choices was the choice to go into the cloud. What was brought as a real advantage, namely that the cloud would always ensure that we have the latest and greatest, can also be regarded, with many more spotlights on it, as a real threat and a danger. Because of the complexity of our system and the effects that even minor changes can have on the robustness of our system. The effectiveness of governance plays a very important role I think. And I think that in general, we are not too bad.</p> <p>Liva: So perhaps if I understand it, then in this sub-category you see the challenge as that the governing body does not always have the vision or strategy that is... Sort of ... Hmm how to define it?</p> <p>U3BU: It's a difficult point. Sometimes it's even awkward because you can only find out after a while the effect of your choices. So that's a real nasty one.</p> <p>Liva: I think it all sort of comes back to the 1st sub-category of User organizations where one defined challenge that I found also for other organizations, is how to choose the right options and I think this is one of those. That there is this challenge, how do you know which will be the right choice to make for your organization in the long run?</p>	
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User	Refinement	PBE Phenomena	Evolution	<p>User organization challenge to keep up with PBE evolution</p> <p>This goes two ways. 1st way is that the PBE is enriched by new functionality, for example, where we can do away with stuff that we have programmed in past, which has a very positive effect. And we've seen examples of that in the past where we were benefiting from the new functionality. But it also goes the other way where they introduce new functionality, which clashes with some of our customizations and we see that as well, and then we have the third ungraspable category where we see all of a sudden in CRM many errors being manifested without any logical explanation and we are seeing more and more of those and you said it yourself.</p> <p>Liva: So yeah, this comes from the literature. Here I say challenges related to the ability of the complementors to adjust and coexist. But here perhaps we attribute it to the user organizations to adjust and coexist with the evolution of the platform.</p> <p>U3BU: Exactly. Complementors in general, Experlogix is a gold partner of CRM, of Microsoft, so they will always coexist in the right way. That's more or less what it is. They are doing a good job at it. For the rest, I don't really know.</p>	<p>And what did we discuss about the solution - stop customizing, right?</p> <p>U3BU: Yeah, it's a bogus solution, but that would be a good solution.</p> <p>Liva: The first step to start identifying, as you said, where the challenges come from.</p> <p>U3BU: Yes. You can build in mechanisms of course that give more control over what's happening and how things are ungraspable. We have all sorts of mechanisms built-in and perhaps we need to build much more in order to make sure that we don't run into these situations again. That's the way to solve it, well maybe not to solve it, but add more grip on it.</p> <p>Liva: But is that not another customization?</p> <p>U3BU: Not necessarily, you don't really alter the system then. It's an enrichment of your toolset outside of the PBE.</p>	<p>Yeah, the relevance of this challenge, I think we established already that it's quite large, such as the moving into the cloud and all the errors it can cause.</p>
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							<p>it or a lot of investment from our side.</p> <p>U3BU: A lot of hourly investment, labor investment. One of the challenges was also that within Thermo Fisher everything is blurred. You don't know where you need to go if you have an IT problem. You can shoot a ticket into the system, but if they kill it, you still don't know where you should go.</p>
User	SLR	Architecture	Modularity	Modularity and fragmentation	<p>Yes, yes. We've seen stuff like that happen. I think Miller Heiman was an example where something went wrong at a certain stage. If they have their own cloud-based systems then these complementors can also tweak something in their program here and that can have massive effects or subtle effects like that 9th decimal. There</p>		

User	NEW	Specifics of business model	User organizations	<p>Solution dependent on a particular person</p> <p>Yeah, I always feel a bit in an awkward position in this organization because the Configurator plays a fundamental role, but it's interlocked with the whole program, but in the end, it is nothing more than a piece of IT equipment. It's just software. Then again - I have a special function because I'm responsible for all the models, the configurations that we keep in the Configurator. But I'm also involved in the IT side of the whole story, so I did some programming myself and I'm in a weird way connected to many different parts of the whole thing, and that that makes it nice - I like that, but it makes it all also very challenging. This is because I have to operate with all these guys to make sure that stuff stays in sync, and that's almost impossible - it's too big. But it still needs to be happening at all times. And that means that I have to stay alert at all times. I invited myself for these IT meetings, I de-invited myself because they are too boring for words. But on the other hand, I am reading all their meeting minutes because I need to know what's cooking. For example, they have a picklist somewhere and that picklist has three values and those three values drive some bit of logic in my Configurator. I need to make sure that when a fourth entry is made, that it also keeps operating in the expected way. Or the fourth choice may mean other logic again. It doesn't matter, but in the end, it can have an effect on the field. So, for me, it's always to stay alert to make sure that all that sort of stuff keeps ongoing. And that is a very big challenge for me. How do I move in a system that is customized so fast and that's evolving so extremely fast? Where my Configurator, and I say "my Configurator" on purpose - it's my baby - where the Configurator plays that critical role in the whole building. That's a challenge for me. I think that's an organizational challenge, but perhaps it's more than that. I don't know.</p>		
User	NEW	Specifics of business	User	<p>Insufficient resources to discover new solutions</p> <p>Nearly every week you get new technology, you get inspired by the vendor. The company, like our division, simply does not have the bandwidth - the people, and sometimes the money needed to get ready for that new ecosystem, for all the new technologies.</p>		

User	SLR	Specifics of business model	User organizations	Development of correct options	So, you have to set continuously new priorities, balancing what is really needed to support the daily business versus new technology, which is nice to have, or which is contributing to organic growth. So that is a balance you need to make as a team together with IT and with the leadership team and with the users - in what kind of things will we put our hours and money. That is an almost daily challenge for the CRM support team, for IT, but also for the people who need to make decisions on the investments. That is a big challenge: you want to do everything, you want to do more, but that's not possible.		
User	SLR	Specifics of business	User	Technology use inertia	And sometimes you still meet an account manager who rather prefers to do everything in Excel, than in CRM. And yeah, these guys are not working at the highest efficiency and effectiveness rate. So, I think that was a challenge at that time.		

User	NEW	Specifics of business model	User organizations	Growing complexity	<p>Yeah, for the CRM system the main focus is on sales. So, this is the account managers who are the user. You can put a lot of functionalities into a CRM system but in the end, the account manager needs to close the deal and he needs to sell, to meet with customers. A good account manager I would say is spending 80% of his time on interacting with customers, virtual or face to face. So, with each embedded functionality you add to the CRM system, probably there is some more data maintenance and data creation added. So, you have to avoid that we become the victim of our own CRM ecosystem, so you always have to balance that and that is an ongoing challenge, where you only need to add the functionalities, which really add to the productivity, the efficiency of an account manager. If the balance is that they claim that they are more working on CRM than meeting with customers, then everything is getting out of control, so that is an ongoing challenge.</p>	<p>Yeah, I think it's important to listen to the users and understand their world. From time to time we had a CRM core team meeting and two years ago at the Global Commercial Meeting, we had a four hours workshop. So, we got a lot of feedback. You have to avoid that the CRM support team / IT team is working in isolation from users. And yeah, with all the change management techniques, as long as you have good representation from the users, then that should be OK.</p>	
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User	SLR	Specifics of business model	Local challenges	Inadequate infrastructure	In my new division absolutely, I mean simple things like Wi-Fi connection. In the past, with embedding all the technology in CRM in certain regions of the world like China, we had limitations. Moreover, we spent more than half a year on this. The Chinese people or people traveling to China complained about the speed of CRM. At a certain moment, IT could prove to me that it's not the CRM application, is because all the filters the local government put into the CRM system - every word or every data piece which is entered into CRM is also watched by local governmental organizations. That is simply causing a delay. Yeah, whatever we did on the IT side, from CRM and IT support - we could not overcome these challenges, which our final users - sales, SSOC - could see. And I experienced myself being two or three times in China, I was simply counting the seconds when I hit the enter button what it took on the other side to see that data, and then you sometimes need easy about 10 to 15 seconds. And when the Chinese people were in Hillsboro, they said wow, if I click here on enter, then it is immediately happening. That did not happen in their own system. So, I call that a local challenge (laughing).		
User	Refinement	Specifics of business	Local	Language	Yeah, I think. It's getting better, but still - we have language barriers. My experience is that the new generation, for instance in Asia is well educated in English, especially in China, Taiwan, Korea. In Japan, we still have language barriers. And often that delays the adoption rate of CRM process training and using the functionalities etc.		
User	SLR	Ecosystem Governance	Regulatory	Regulatory	So that's again onboarding planning, etc. And the last local challenge, I call that the GDPR ruleset - all the rules on privacy data. So, in Germany specifically, I think each company has problems in dealing with marketing and contact data. And there are a lot of protocols in place, which complicates doing communication with customers. I think this is especially for a company like Thermo Fisher difficult to understand and difficult to deal with countries like Germany.		

User	NEW	Specifics of business model	User organizations	Incorrect use of PBE functionality	If I look back in the electron microscopy world, you are dealing with a long sales cycle - for material, life science, the average sales cycle from the moment you make first contact until you pick up a PO is about 25-26 months. For almost 20 years we had sales stages. Looking at the dynamics of the markets, there was one quarter, I think it was Q4 2018/19 where we missed quite some business because quite some account managers made the wrong judgment about the sales stage and that resulted in a complete redesign of the sale stages. So, you must have heard about it that there was quite some redesign on the sales stages and so here I would say - this is an example where the market dynamics were forcing us to introduce a new way of judgments made by the account manager on where they are in the sales cycle. I think of it as a good example of the market dynamics and the impact on the CRM system		
User	NEW	Specifics of business	User	Incorrect use of PBE functionality	Yeah, so we were using the data from user login and user metrics, to work on improvement from users who need to use CRM let's say almost on a daily basis. So, the challenge was to engage users to use the CRM system for what it has been made for.		
User	NEW	Specifics of business model	User organizations	Safeguarding sensitive data	Yeah, in a few cases when people were terminated, I needed to get an alert immediately because at that moment I was alerting IT and owners of applications to immediately switch off their access because we had situations where they downloaded a lot of data and the week after they were working for the competition. So, in the last five years, we saw people leaving to a competitor, to other companies and most of the guys were good guys, they did not violate. But there were also a few situations where we immediately had to cut off everything. And at that moment, every minute counts, we could show that they were downloading documents from Box, or exporting accounts and contacts and the data, so very sensitive data.		

User	SLR	Specifics of business model	User organizations	Development of correct options	<p>U4BU: Yes. I think for me, owning with my team CRM, the biggest challenge in the last 10 years was aligning on the road map. If that is an example for CRM. With all the new technology coming on the market, with sometimes budget limitations. And with so many people who would like to have a voice in what we should do in CRM, aligning on the road map became a continuous stress factor. And it also resulted in situations where I could not find all these sides because people were not buying in and then we were working on things on a not-aligned road map and that felt bad for IT people, for my team members, for me. Yeah, so that was really for me, for CRM, the number one challenge.</p>	<p>Yeah, this is about trying to compose the right decision-making teams, that include leadership, that include users. And you present your road map. What I did, I did a lot on the visualization of all the pending requests, of all the new technology, what I was aware of, I put it in a list. And I did some pre-selection on priorities and then I presented that to the leadership</p>	<p>the biggest challenge in the last 10 years was aligning on the road map</p>
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User	SLR	Specifics of business model	User organizations	Development of correct options	But my challenge was that the leadership was not able to make a decision. So, no matter what I pushed, they did not make a decision and that was not very helpful. That was my biggest challenge.		That was my biggest challenge.
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User						
SLR						
Ecosystem Governance						
Data Management						
Data Management				<p>No, when it says to loss of data, I mean there was never a loss of data because CRM system - once you enter it, it's difficult to remove it without the help of IT. I mean you can deactivate data, but you can never remove it. But I think when it is about the loss of data then it was about people who downloaded data. At a certain moment about 7-8 years ago we had a situation where the channel partners, the distributors, and the agents, who had access to CRM - they still had the option to download data to an Excel and we had two or three situations where distributors violated that because we can see when they export data. We immediately stopped the functionality to export data for agent users.</p> <p>Liva: Could you give a little bit more background on the relevance of this challenge?</p> <p>U4BU: The importance is that sometimes you also terminate the contract with an agent or distributor. When they start working or when they're already working for a competitor, yeah, then they have valuable data they can use.</p>		
					<p>Could you give a little bit more background on the relevance of this challenge?</p> <p>U4BU: The importance is that sometimes you also terminate the contract with an agent or distributor. When they start working or when they're already working for a competitor, yeah, then they have valuable data they can use.</p>	

User	NEW	PBE Innovation	Innovation acceptance and adoption	Innovation adoption	<p>U4BU:</p> <p>Yeah, with the new generation coming on board, these people are more mobile-oriented than let's say laptop-/computer-oriented. So, with all the new technology we offer, we are also responding to their desires to work more mobile. That might be an example where we say, OK, like in Asia, a lot of people... Where in typical American user would be doing, let's say 90% of their time behind the laptop, I've interviewed Asian users like in Korea - they do 80-90% on their tablets and smartphones in CRM, they created opportunities, whatever...</p> <p>Liva: How would you define the challenge then? Is it the complexity of managing the mobile version of the ecosystem?</p> <p>U4BU: That's an extra challenge for IT to make every functionality in the laptop also workable on mobile devices.</p>		U4BU: It is not critical but becoming more impacting.
User	NEW	Ecosystem Governance	Ethical challenges	Unethical behavior of user	<p>I can think of one thing. It's even related to a program within our division, but it is too sensitive to mention. But it was in a situation when an old team member left and an account manager in the USA reassigned opportunity records to that person self and that was a very sensitive situation. I reported that and for me that wasn't a situation where I'm not saying there's a loss of data, but it was against integrity on data management.</p>		

User	SLR	Ecosystem Governance	Control	Control	<p>U1IT: This is another challenge because when you go to online, you have to follow the rules because they are updating the system automatically instead of you have control on it. So as long as you stay on-prem you have control on when you want to update it, unless you are two major versions behind because then there's no support anymore. But when you go online - your application is hosted. And at that time, you have to follow Microsoft rules for updates. So, if they update to UCI, a special interface, you have to follow along in the same pace, which means you need to put developers on to change that form to UCI. Otherwise your system will break.</p> <p>Liva: So, the challenge is that the changes actually, as you say, every half a year, is it very frequent...</p> <p>U1IT: It can be intrusive to the load on your employees. You developers and BSAs need to check if everything is going right and if something is not going right you need to make changes and you need to... You're forced to have to change before a certain date as a deadline.</p>		
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User	Refinement	PBE Phenomena	Evolution	<p>Ability to keep up with evolution</p> <p>U1IT: There's technical challenges. Technical challenges are the challenges that Microsoft every half year makes changes to the system. I need to cope with it. Meaning if you have an old system which we have, we have a system which is coming from 2007, that is when we started with this CRM. Then we released it. And at that point we went through from CRM 3.0 to 4 to CRM 2013 and then we skipped a few and then we went to CRM 365 and then we went to online. This is another challenge because when you go to online, you have to follow the rules because they are updating the system automatically instead of you have control on it. So as long as you stay on-prem you have control on when you want to update it, unless you are two major versions behind because then there's no support anymore. But when you go online - your application is hosted. And at that time, you have to follow Microsoft rules for updates. So, if they update to UCI, a special interface, you have to follow along in the same pace, which means you need to put developers on to change that form to UCI. Otherwise your system will break.</p> <p>Liva: So, the challenge is that the changes actually, as you say, every half a year, is it very frequent...</p> <p>U1IT: It can be intrusive to the load on your employees. You developers and BSAs need to check if everything is going right and if something is not going right you need to make changes and you need to... You're forced to have to change before a certain date as a deadline.</p>	<p>Well, there is one solution that we found - that we would have a dedicated service engineer on the Microsoft side. This would mean that we've got a dedicated person there who's logging all our tickets. Well, at least that's the plan for now. To get one person inside the organization that knows the organization within Microsoft, to know the stuff and to address it better, it will cost money.</p> <p>It's a challenge, because we have very unique experiences and challenges. So, if you address this at Microsoft is different than somebody from insiders mentioning it, right? Because they know that they did the pre-analysis already on the stuff.</p>	<p>It's depending on the change. Like if you see the UCI is very intrusive because all the forms needed to be redesigned to support that specific format. That's huge and we have some coding that needs to be changed because some part of the coding is not used anymore and we are suffering actually from having an old system, where we use all type of codes that are no longer supported.</p>
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User	NEW	Specifics of business model	User organizations	Accommodation of different use cases within user organization	<p>Within the business, like for instance, we have the Nanoport team and we have the sales team, and we have the marketing team. But they use the same entities, right? In an opportunity, the persons says, I want to change the pick list value for this to add this list, but this is the only list that I need to have. And then another person says, well, I don't want to have this list because this doesn't work for us. So yes, we can still filter it but as soon as we change it, we need to have consensus from both the teams to get to the same list that they want to see, right? It's not that we can change it based on one team.</p> <p>Because, there was one team that's managing it, so now the challenge is to make sure that everybody is on the same page. Not that we change something and then all of a sudden another team jumps in there after it's implemented and says that it is not working for them. That happened in the past quite a bit and then we have to revert changes, which is time consuming, wasting of time. We've seen this happening a few times. That is a big challenge to make changes and some things are more sensitive to that than others, like the proposal. On the proposal everyone has its own opinion on how a proposal should look like. If you ask 10 account managers they have 10 different opinions to get that streamlined and have everybody aligned. That's a huge challenge, and then we are not even talking about languages.</p>	<p>Well, the only challenge is to set owners to certain areas. You need to make a person responsible for a certain area and then they have to look at their people in their back office to see if it's working. That's another option that you could make use of. Then you have one key user that you talk to , not have to talk to 10 people to get to conclusion that something is not working the way it should be. It could be process based some are cross entities and some are entity based. And then you don't put the responsibility on Jonas's team. They shouldn't own it that much , it's the business that should own it. And they don't see that ownership at this time.</p>	<p>1IT: Basically. Yeah, it's timewasting, but also for the end user it is frustrating because all of a sudden their functionality is not working anymore. So, it's also a waste of time for the end user side and it's only applying for specific group. To get that consensus between the teams they now created committee groups. And those committee groups are reviewing based on their specialism and their overlap of fields that they're using. I think we have 4 now. I have to say well on one side is good, but it's very time consuming.</p>
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User	SLR	Architecture	Modularity and fragmentation	Modularity and fragmentation	U1IT: That they're young in age, so they built something. Then everybody is working with it and then all of a sudden they say - well it needs to be changed because we can make it much better... and then it's rolled out by Microsoft and then our system doesn't work anymore. The Flow structure is not mature enough to know all the processes from the business, from Microsoft perspective - our business for them. Like for instance, I can give you an example, so we do development, to QA , to Prod, which is a regular process for development. But as soon as we move our solutions from a Flow from DEV to QA, it needs to go into one solution and then it breaks, and then we need to go in CRM and tweak some stuff in the back end to make CRM work again because otherwise all the records are still related to the other environments. So they didn't think about how business process are working when they implemented the process of how they are moving stuff from one environment to another environment in Flow.		
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User	Refinement	Ecosystem Governance	Coordination	Coordination	<p>And impact can be big. The lead time for projects is around about three months, three to six months, sometimes longer. But as soon as you start something within those six months, things cannot be evolved. And that's what we saw with an application and they say, well, we have to switch this, and they did the switch just before you go live and then we have all of our processes broken because every mapping is off... These kind of changes are so intrusive into something you implement for the time that you have these stuff implemented, and in the meantime they're also doing development on their side, of course. And it's all for the better. But they don't warn upper hand. It's just the piece of communication that needs to happen. Or do an investigation about what the business really wants because that's not what they did. We haven't heard anything - let's say it that way. Yeah well, it seems like we always are on the bleeding edge and not on the leading edge. We want to be on the leading edge, not on the bleeding edge.</p>	<p>Basically, for this challenge, as the first step that will help a bit. But then still I mean there's so much communication and they say - well, you have to go to the website, and you get a lot of emails, then you get a lot of emails and you don't read all the emails. I mean, I even have it now. I got lost in my emails so the only way to do that is to have a session once a month or two. To have a dedicated engineer explaining what the changes will be, because we don't have the time to look at the details that we need. Because when they do a change on Flow, it's on Flow on the whole package. But we are not interested in that. We are just interested in a specific piece and that's the piece why we want to have the in depth details. And then they have to make sure that the engineer is not leaving every three months because that doesn't help.</p>	And impact can be big
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User	NEW	Specifics of business model	User organizations	Design Lead time	The challenges that we have in this case is that people don't know what they want. They know what they want, but they cannot put it on paper. It's like if I want to have a car. I want to have a blue car, but I don't know what the engine should look like. Now you develop something, you give them a blue car and then they sit in it and they say, well yeah I need to have another engine. And so then you say, well I can give you this engine, they try it and then - no that's not enough and you give him another engine. This is the experience over the rate of process which makes development difficult. If you have one person that knows already 80% of your field of business or what they want, then it will save you a lot of time because otherwise it will be a lot of going back and forward until you get there. But it takes a long time and it could be that you make an implementation decision at the beginning that causes issues at the end, but you have to redesign the whole process.	Get a subject matter expert (SME), a person who knows the system but also knows the business. That's what we do. We add Jonas to it. he knows CRM and he knows the business, at least he understands the business process from end point already for 80% which makes it easier for him to say what's really needed. This is the reason why he's always involved in these BRDs.	They are time consuming because you built something and then if somebody doesn't know what they want, then eventually you have to re design everything. Yeah, it means that you have to start all over, which delays projects or changes.
User	NEW	Specifics of business model	User organizations	High demand for solutions	Yeah, there is a high demand for solutions. It's not customizations in general. If they have a high demand for solutions, and if they don't get any foot on the ground on the ERP system because it's quite rigid, they try to find other ways to get there and then they always find the easy route, which is the CRM route, because you can do integrations nowadays. So yeah, so why not automate?	Liva: So here you again need this owner, who can hear or coordinate the solution? U1IT: Yeah, at least give some background, to talk to them at the same non-technical level.	It creates a high load of projects. So, we will create a high demand on resources from our side. And every process needs to be looked at. On one side is good, but on the other side, in most of the times, these are not the savviest people with CRM. So, they're not CRM aware, and then we need to have Jonas involved - it takes too long.
User	NEW	Ecosystem Governance	Control	Appropriate control mechanisms within user org	Yeah, well. You know, hitting a sensitive spot here, because we have a control freak in the organization specifically to security. So, for a simple app registration, which is a registration for application to be used for CRM system you need to have his document and it's really painful to get through. It's has 180 questions, and on top of that - 84 questions for a simple change that you can do in 5 minutes. I think there's too much control that they want to have an app registration.		

User	NEW	Ecosystem Governance	Control	Appropriate control mechanisms within user org	On a high level, let's say this is like shooting with a cannonballs on a mouse. I mean, it's that's what they're doing, it's like. Why are you asking that for a company that only consist of 10 users, how does security managers manage their security settings? These kind of things. it's like an overkill of questions for a company that's too small.		Well, 5 minutes against three months. Yeah, so very time consuming.
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User	SLR	Ecosystem Governance	Effectiveness of governance	Effectiveness of governance	Not for the complex items that we have, then we should immediately route it to a Microsoft engineer. The external contractors don't do it - they keep you on the line because they get paid for every ticket.	No, it's just the questions that we have to Microsoft. And hope to solve it by the engineer, the dedicated engineer so we can address these kind of things and they are immediately internal and not having the external resources anymore.	It delays our solutions.
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User	Refinement	PBE Phenomena	Evolution	Time to follow PBE evolution	<p>We have the technical evolution, of course, but we also have business evolution. So, this challenge separates into two. The business evolution we have to follow along. If we don't, then we are not getting anywhere because our CRM system needs to mimic what's in the business. Like for instance, where it went to sciences from 2 Sciences, life science and material science. So they went to Sciences instead of Life and material science, so they're merging those two. Well, we know that, so that's going to happen. But if you don't do that, then the system doesn't work anymore. Yeah, and reports are off and those kinds of things.</p> <p>Liva: But I mean as in the framework of the platform-based ecosystem. Do you experience any challenge of the ecosystem to adjust to this evolution or for us as an organization to catch up?</p> <p>U1IT: We need to spend time on it because of all changes.</p> <p>Liva: But that's not specifically a challenge, I think, right?</p> <p>U1IT: I mean, it's always a challenge - time. Time and planning is the challenge always in this case. because yes, we need to follow. I'll do it, but the questions is - WHEN you have the time to do it.</p>		
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User							
SLR							
Architecture							
Interoperability							
Interoperability					<p>U1IT: Always. Because they always have new features that you want, and it takes a long time to implement.</p> <p>Liva: OK, so the challenge is indeed that it takes you a long time to implement...</p> <p>U1IT: ... the new functionality because they always have these new functions and then we need to make sure that it's working. So, there's a lot of checking that needs to happen. Most of the time you want to make use of the new functionality, because that's what you upgrade, right?</p>		
						Once a year. It is just happening once a year, at least we will do a review. And at least once in two years we need to update.	

User							
SLR							
Architecture							
Customization							
Customization				Always. With Microsoft changing all the time, some stuff doesn't happen because of change that they applied, so we need to double check everything for every deployment. Another challenge is the management of the customization. So, you want to see what's going to go live. The challenge that we have is that you have projects aside of regular changes and you don't want to have these projects to be moved to the regular changes. So, it is difficult to split them up from the regular changes and the projects. Because the projects have a different go live date, but they can hit the same entity. So, like for instance, we have a quote and on the quote we add a field. And that field is for a specific project, but as soon as you move the form from the quotes, there's a form change, like they want to move one field to another place, that specific field - that new field also needs to move. And then there's an overlap. And how to manage that - It's very difficult.	Can be impacted. and how to recognize something is impacted on paper? Practically you know it in your head, but we don't know it on paper. The more developers and BSAs you have, the more complex it becomes. And the only solution to get that is to have a good management tool for management changes. Then you can manage it well - whatever, because the project is also a change.	Liva: How would you judge the impact of this customization related challenge? U1IT: every two weeks? Liva: So, it's continuously relevant? U1IT: Absolutely.	

User							
SLR							
Architecture							
Modularity and fragmentation							
Modularity and fragmentation					<p>Yep. Chrome. So, what Chrome does it, it has an auto update function. And with the auto update function - for instance, we make use of a cookie and we go to two sites. It's called same site cookie. You use one cookie to go to two sites and they block it all of a sudden - because of an update that happened on the browser. So, it's a vendor, an external resource because everybody is on Chrome or Edge, but on Chrome they started. And then we see something is not working. We have to do the analysis what is causing it - that's one, and once you figure out what's causing it - you need to fix it. And then I'm the lucky guy who knows about operations to know how this kind of things can be fixed. But if you don't have that, that will be a big challenge. Because then you have to have all the users make changes to system.</p>	<p>Yes, the root cause , this is very important to making a solution to a problem.</p> <p>There's another important thing, and that's something that never happens. Once it's solved, let's do a review on how we could have done this better, and this is not going to happen anywhere at any time. That's even a bigger worry point, because then you don't learn from your mistakes or from the issues that arise</p>	<p>Liva: Yeah, so this is an example of the impact on the user experience, right?</p> <p>U1IT: Yeah. Then all of a sudden the functionality doesn't work anymore. Like Xpertdoc, proposal generator or Experlogix even.</p>

User							
Refinement							
PBE Innovation							
Innovation roadblock							
Innovation roadblock							

User							
SLR							
PBE Innovation							
PBE/Product innovation							
PBE/Product innovation					<p>U1IT: Yeah, well we're constantly innovating.</p> <p>Liva: I think here we again can pull in the Flow challenge that you described, so it's an innovation on your platform.</p> <p>U1IT: You can</p> <p>Liva: And the customer support quality. We also discussed already.</p> <p>U1IT: The customer support quality and again this this falls in the same header indeed. If the problems do not get solved because.... I have a ticket open. For instance, for performance on CRM open since September last year. No innovation, no response. It is killing our business if it's eventually not solved.</p>	<p>U1IT: You know the engineer from Microsoft.</p>	

User	NEW	Specifics of business model	User organizations	Accommodation of different use cases within user organization	<p>It is to make the system work for all the users and not for a specific group of users which is very difficult to manage. The bigger the group becomes of users, the more complex it becomes. And the more intrusive things become because, well, for instance, if you do the NSR integration that can have impact on other stuff because then of course they want to do the renewal on service pricing for NSRs and other things. So, it all intertwines because the whole business intertwines. We need to be able to chunk it up in small chunks and then at least prepare for the future, but not make a block for the future, and that's the biggest challenge - to know your future and how your end position would be in the system - to implement things, to prepare for that. It's difficult to define that, but you need to have a future statement, so you need to have a visionary within your organization to say - this is where we want to go to. Without the visionary - You never will get anywhere. Unless you want to do a lot of re-work.</p>		
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Complementor						
SLR						
PBE Phenomena						
Evolution						
Evolution				<p>One challenge that prevails, not only for us, but I think for any partner that develops add-on solutions for what I call the host platform, being Microsoft, is staying current with updates that Microsoft provides. For instance, if Microsoft comes out with a new release of Dynamics CRM tomorrow, there's a strong possibility it will break integrations that the partner has done to the CRM system. It's super important for the partner to get pre-released versions of the references to do the testing, to ensure that we are compatible with the next release. Microsoft has a very aggressive release cadence so if the partner does not stay in lockstep with Microsoft and Microsoft introduces a new release of CRM, and it does break partners integration, then the customer is in pain right? And then they have to wait for the partner to update, so that's just a constant challenge that we all have in that space - to ensure that we're in lockstep with Microsoft releases</p>	<p>Well, we've solved it, but I'm saying in general it's a challenge for partners. We happen to have an elevated status with Microsoft. So, we're one of 20 ISVs (Independent software vendors) in the world that is part of this program, which gives us this early access to releases of Dynamics so we can do that testing. So, we've solved it in that aspect. Partners that don't have that luxury, they need to stay in contact proactively with Microsoft product managers or developers to get visibility into their road map, to see what's coming in the next release, to find out when it's coming so they can do that preparation. Not be reactive, but proactive with Microsoft to understand where they're going with the product, what the road map looks like in there, and their delivery schedule. That will help solve this issue.</p>	

						<p>we're at a lower risk than somebody who develops, let's say, marketing automation add-on to CRM, right? You can argue that virtually every company needs marketing software. So, they are more at risk in that situation. Hopefully, that's helpful.</p>	
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Complementor						
SLR						
Ecosystem Governance						
Control						
Control				<p>Yes, I think I understand this question correctly. Microsoft introduced a control mechanism to the partner community a couple of years ago, which was that they mandated that every partner that wanted to connect and build an integration to their platform was required to become a certified partner. So, this is Microsoft exercising their control over the partner community, so they had to become certified and they also had to have to pay a percentage of their sales back to Microsoft. That's an example of contractual control that Microsoft has introduced a couple of years ago to the partner community, to the partner ecosystem. An example of control around technology would be, for instance, they introduced a new experience for mobile applications, for phones and tablets, and there was a certain technology that was adopted which then transcended down to the partner where they had to adopt this technology. So, it's another example of control - if you want to connect to our mobile application - this is the protocol, this is the types of software that you need to develop in order to provide an integration to our CRM system for the mobile experience. Those are the two that I can think of.</p> <p>Liva: Yeah, I understand the challenge clearly in the second example, because then you are sort of forced to go along with the functionality. Regarding the first one, I mean, I understand the challenging situation of paying a specific percentage, but regarding the certification, in the space of ecosystems, is that an unusual experience, so it's rather challenging to achieve that?</p> <p>C1S: No, it's not. There are some challenges to achieve it, but it's not an uncommon practice now that, what I would call the OEM - Microsoft or Oracle or Salesforce, are instituting to the partner community. Did it exist 10 years ago? No! But it's fairly common now and, you know, it's a mechanism to control their partner community.</p>	<p>It's just the cost of doing business. If you want to participate in this ecosystem, this is what you have to do. And so if you decide that you want to be in this program and you're going to pay a percentage of your revenue, you either have to increase your prices or you have to absorb it and have reduced profitability or pass that along to the customer. These are really the three options.</p>	<p>No, it's not. There are some challenges to achieve it, but it's not an uncommon practice now that, what I would call the OEM - Microsoft or Oracle or Salesforce, are instituting to the partner community</p> <p>Liva: Yeah. How would you describe the impact, the relevance for your organization of this first control challenge?</p> <p>C1S: We're having to pay a percentage back to Microsoft. So, it has a substantial impact on our revenue. I would say on the positive side it's made for a better customer experience because Microsoft has outlined that this is how you will connect with our system to provide a better customer experience and provided those guidelines to the partners so that they develop their integrations correctly and provide a better user experience.</p>

Complementor						
Refinement						
Ecosystem Governance						
Coordination						
Coordination				<p>Yeah, so it's a continual challenge.</p> <p>Liva: I'd like to ask just for a little bit more background so that I understand in which part of this description to place it.</p> <p>C1S: I think on the last point around the management of relationships. That is something that is a challenge that we face annually. Relationship management with Microsoft is super important and the reason why it's a challenge is that constant reorganizations are going on every year at Microsoft. So you could build a relationship on management level with Microsoft and build this great foundation professionally and oftentimes you work with them long enough to build a friendship as well, and then they move on and then they get transferred to a different group and you have to start all over again and build that relationship. Because the organization is so big and there are many important managers in product management in software development and sales and marketing, it's important, it's critical for the partner to be able to manage those relationships with all levels of the organization, if you truly want to be a Premier Partner and provide a good experience to customers and be thought of by Microsoft as an important partner. So what we've done to help solve that challenge is, we've hired an individual that focuses 100% on Microsoft relationships. So, we call it Microsoft Alliance Director and her job is to manage relationships at Microsoft.</p>	<p>So what we've done to help solve that challenge is, we've hired an individual that focuses 100% on Microsoft relationships. So, we call it Microsoft Alliance Director and her job is to manage relationships at Microsoft.</p>	

Complementor							
Refinement							
Ecosystem Governance							
Finance							
Finance				<p>Well, I think in general a platform provider needs to be confident that the partners that they work with are financially viable, that they're profitable, that they're taking care of their customers well, that they are investing a sufficient amount of percentage of the revenue back into research and design. So, I think it's important for a partner to demonstrate to Microsoft that the company is fiscally sound. And in order to provide the assurance and the confidence to Microsoft that partners that they are recommending in their system are financially strong.</p> <p>Liva: Oh yeah, alright. Did you experience this challenge perhaps in the starting years?</p> <p>C1S: Yeah, I mean a bit. When we were a lot smaller, I think there were a lot of questions around our size and our ability to execute based on our revenue and that type of thing. So, early on when we were more in kind of that startup mode, there were some questions there, particularly in bigger organizations who were looking to make an investment in us. We were super careful about our finances, but we were also very transparent in providing our financials. We saw early on that was very important and we did want to be highly leveraged and we wanted to show that we had plenty of money in the bank and that we were comfortable.</p>	<p>We were super careful about our finances, but we were also very transparent in providing our financials. We saw early on that was very important and we did want to be highly leveraged and we wanted to show that we had plenty of money in the bank and that we were comfortable.</p>		

Complementor					<p>C1S: This one's relevant. From the host platforms' perspective, they have a certain development path and a road map that the business is aligned to. I don't think they are as concerned about whether or not they are in line with the partners' goals. But what they are trying to provide is a road map that would be attractive to partners to build solutions that would augment their road map and their new features as the product evolves. For instance, an example would be in the evolution of Microsoft CRM: Microsoft is getting more involved in introducing artificial intelligence in the platform. And so, there's an opportunity for partners to add their own AI IP to supplement what Microsoft is introducing and future releases of dynamics. So, the challenge is that the platform owner is saying, OK, this is our road map partner, you need to adjust. You've got to find ways to coexist or survive. But what they are doing is stimulating the partner community and making their road map transparent and say - this is what we have coming out, here's the opportunity for you to make money and attach to our platform. So, you know the thing with software is that it is never done. It's constantly evolving, and so the partner needs to be smart about how they're going to coexist with that core platform. Again, as we talked about earlier, it's all about being proactive and understanding and building those relationships, understand where Microsoft is going with the product so that you can adapt to it and survive.</p> <p>Liva: Yeah. Are there any situations where this type of evolution of the platform clashes with your own roadmap or is this not so relevant for you?</p> <p>C1S: Yes. I mean Microsoft has started to introduce some light capabilities into the product, but it hasn't really affected us, because it's so light that it's just frankly not that good or it's cumbersome to use, so people don't use it. But for other partners it has impact. There was a time a few years ago where Microsoft didn't have a marketing module at all in the CRM system and so there were some partners who have built some fantastic marketing add-ons to CRM and flourished over that</p>	
SLR						
PBE Phenomena						
Evolution						
Evolution					<p>I think another strategy is, if the product is evolving and making your product somewhat obsolete, then obviously you need to work with other host platforms to develop integrations. So, would your solution work well in the SAP Community, in the Oracle community? What do other host platform providers develop integration with and supplement their offer? There are so many host platforms out there, that's the exciting part, is that there are lots of different CRM and ERP developers out there.</p>	

					<p>time. Yeah well, guess what? Microsoft built its own marketing platform. I like to say it takes Microsoft three times before they get it right, so the first couple releases weren't very good, but now it's getting better and it's affecting the partner community because they built this functionality themselves.</p>		
Complementor	Refinement	PBE Phenomena	Legitimacy	Legitimacy	<p>We're constantly facing challenges on the cognitive side. I'll give an example to see if it's relevant. There's more demand for companies that provide it's called field service activities, so there are organizations that don't produce any tangible products but provide a service. Like repairing elevators, for instance. All they do is provide services for preventive maintenance, break-fix, contracts for elevators. It's not a new industry, but it's an industry that is starting to adopt technology to streamline its processes for quoting those contracts and pricing those contracts. So, for us to succeed in that industry, we need to understand what the demands are. Because it's a lot different than in FEIs case, configuring a microscope. So, to be legitimate and succeed in that new industry vertical we need to understand the requirements and the demands so that we could offer solutions to solve the issues in that particular new emerging market.</p>	<p>The best way of all is to be in a situation where we find a prospect that's interested in working with us to solve these issues and they tell us rather than us guessing (laughing). They tell us what their requirements are, what their challenges are, there is no better source than the customer themselves.</p>	

Complementor	Refinement	PBE Phenomena	Platform dynamics	Platform dynamics	Right. I mean, that's always a challenge - for a partner to ensure that they can comply with the certifications. You know we similarly introduced an integration to the Salesforce community and so there were several things that we have to do to become a Salesforce partner. In the end, it's in the spirit of number one - it's all about finances, of course, but it's also in the spirit of providing a good customer experience as well. I mean that's important. Yeah, so I wouldn't say challenges, no. It's just part of doing business.		
Complementor	SLR	PBE Phenomena	Platform properties	Platform properties	No, I wouldn't say challenges at all. I think the only challenge is more on the cross-network side of things. You know the more companies adopt the platform the better it is for us. So, there's more opportunity for us. Candidly, with certain platforms that Microsoft develops, they are nowhere near the leader, and we wish they were (laughing) because then there's a cross-side effect for us. You know, more people using the platform, more opportunity for us. That would be about the only challenge I'd see on that side.		
Complementor	SLR	PBE Phenomena	Platform startup phenomena	Platform startup phenomena	Yeah, since this question is centred more around the platform start-up, I think the only thing I can comment on here is that we did participate in the start-up of Microsoft CRM back in the 2004/2005 time frame where they released the first version of CRM. At that time, it was a platform start-up, and the challenges that they had are the ones you illustrate there. Microsoft had to break into the market and increase market share. As a partner, we decided it was a safe bet for us to develop an integration, because hey, it's Microsoft (laughing). Now they're there, they succeeded in virtually everything that they do, and it was a relatively safe bet, right? So that's why we did it and it was a good move.		

Complementor	NEW	Specifics of business model	User organizations	Insufficient resources to comply with coordinated change	<p>We have challenges with ensuring that our customers adopt the new capabilities that we're introducing to the product each year. As an example, I spoke with the customer yesterday that's been using our software for about 7 years. They are on an old version of our software. They're struggling with some things and that would be solved if they would upgrade and take the time to add these new capabilities of the software. On their side – they are resource-constrained, they've got one part-time person that's maintaining our solution. It is a kind of a chicken and egg thing for them. You know they see all this great stuff; they just don't have the time to do it. So that's a challenge that we have. Not sure that necessarily fits into what you're asking here... Ensuring that our customers are leveraging the new capability, that they're aware of it first of all. And then they're implementing it, they're taking advantage. So that there's greater user adoption, there's greater customer satisfaction with the solution.</p>		
Complementor	NEW	Specifics of business model	Innovation acceptance and	Adoption of new solutions	<p>Well, it comes back to customer satisfaction, right? And we want our customers to be satisfied. We want them to keep renewing every year. So, we're faced with this constant challenge of ensuring that customers are adopting our new capabilities or new approaches so that they're satisfied.</p>	<p>C1S: We provide orderly customer updates to announce new capabilities. We are also proactively reaching out to our top customers. We have a customer success department that reaches out to every customer to take their temperature, to understand their satisfaction, if they are running into challenges or issues, that type of thing.</p>	

Complementor						
SLR						
Competition						
Assimilation						
Assimilation				<p>Look, it's a constant threat for sure, something we always have to be mindful of and think of the strategies and business planning should assimilation take place by the platform provider. Other than what I've described, I'd say no. I think the solutions and the strategies that we have are continuing to add more functionality, round out our product to make it a more attractive value proposition than what the platform could ever provide.</p>	<p>I think the solutions and the strategies that we have are continuing to add more functionality, round out our product to make it a more attractive value proposition than what the platform could ever provide.</p>	<p>Liva: Yeah. Just to make sure that I understand it correctly - I see this as a very relevant challenge because it basically threatens the existence of your bread and butter. C1S: A 100%.</p>

Complementor							
Refinement							
Competition							
Assimilation							
Assimilation					<p>I am going to introduce one other topic. It's not just the threat of Microsoft developing software to do what we do or any platform provider, but the threat of them acquiring a competitor and rolling that competitive product into their platform. It probably would be more hurtful, because theoretically that competitor's product will already be very well rounded out and will be embedded eventually into the platform solution.</p>	<p>. The only strategy you can take to help avoid that situation is to be positioning yourselves as the ones to get acquired. Does that make sense?</p>	

Complementor							
Refinement							
Competition							
Dominance							
Dominance					<p>C1S: You know, I may turn this around, we want to be perceived as the dominant CPQ platform for Microsoft. And so, what are our challenges there to ensure that were perceived by Microsoft and customers and their partner community as a dominant CPQ platform? So, there is a lot of work that we have to do at every level of the organization, not only at Microsoft, the reseller community, to ensure that we're perceived as the go-to CPQ platform for Microsoft.</p>	<p>One of the strategies that any... just take my company out of the mix for a moment... One way to prove your dominance is your customer success stories and customer cases and the breadth and depth of customer success and customer references. The more you have, the more you can prove that you are a dominant provider because you have so many wonderful customers and they are saying so many wonderful things about you. And so, it's not the vendor saying how great they are, here's a whole list of customers that are saying nice things.</p>	<p>Yeah, and critical.</p>

Complementor	SLR	PBE Phenomena	Evolution	Evolution	There were some innovation challenges that we had to ensure that we could connect to their cloud-based version CRM. So, they went from an on-premise version. There are a lot of companies that are still leveraging Microsoft annex projects on-premise, and they haven't moved to the cloud yet. But there were some challenges that we had on the development side to ensure that our software was compliant with the cloud-based version of Dynamics. That took some time. There was a roadblock I guess in terms of if we don't hurry up and innovate and ensure we're compliant, we're going to have a sales roadblock. We're not going to be able to support the cloud version of Dynamics. That's about the only thing I can think of.	It's all about being proactive, understanding that road map and when you see Microsoft's corporate strategy, then you've got to adjust and get prepared for it. Be proactive, not be reactive.	
Complementor	Refinement	PBE Innovation	PBE/Product innovation	PBE/Product innovation	The challenge that we constantly face is relaying our value proposition to customers and Microsoft. So, when Microsoft is trying to sell Dynamics to an organization, we have to provide a sales value proposition on why they should bring us into that opportunity, into that sales pursuit. There's a value proposition just to some organizations on how we're constantly challenged with convincing organizations in why making investment or software will in turn improve their profit margins, their sales, their customer satisfaction, streamline manufacturing, and so forth. That's something we face every day. Staying relevant, conveying to the market that we're leaders, that we're product innovators, and ensuring that positive perception is out there in the ecosystem.		
Complementor	Refinement	Competition	Dominance	Dominance	It's proactive marketing. We have three groups that we sell to. We sell to Microsoft, we sell to end customers and we sell to resellers of Dynamics. It's a big challenge to stay on top of mind with each of those groups because there are hundreds or even thousands of add-ons or partners like us out there vying for the mind share of each of these groups. Yeah, so it's a sales and marketing challenge.		

Complementor	SLR	Architecture	Interoperability	Interoperability	<p>So a 100%. Yeah, that is something we face every year. There's not only interoperability with Dynamics that we have to stay compliant with, but there's all the other underlying platforms, the entire solution stock that we need to be compliant with. For example, browsers - we need to make sure we're compatible with all the relevant browsers because we're a browser-based system. With desktop operating systems, with databases, SQL Server. And there are many different versions of SQL Server, and our software leverages that. There's Microsoft Azure, we support Azure, we support AWS or Amazon Web Services - different architectures that we need to stay compliant with. So, it is a constant battle to ensure that we play and interoperate well with the entire solution stock products to make sure that our software runs. And each of those, everything from SQL Server to Azure, to browsers, I mean, when Microsoft introduces a new release of Edge, for instance, or Safari is updated - it invariably will break something in our software that we have to fix.</p>	<p>. The solution that we've adopted is to try to stay in front and try to understand what the road maps are of each of these different platforms to ensure that we can be ready when the release comes out.</p>	
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Complementor	SLR	Architecture	Customization	Customization	We don't and I'll tell you why!	We don't because we do software customizations, but to mitigate the negative impact, we roll it into the standard product. So, any customization that we do goes into the next release of the product, so that every customer gets access to it. We're also not having to maintain different versions of our software, because hey, we've done a customization for a specific company, so we get to maintain that one and keep that ready for them and then another one for this customer. Any custom work that we do just gets rolled into the product, so that's how we've solved this issue.	
Complementor	SLR	Architecture	Modularity	Modularity and fragmentation	I'm not a developer, but I know that our software consumes some third parties. And if those third-party applications break or have issues then it's going to have a negative impact on our software.	Well, I think one of the things we do is limit the number of third parties that we need to be relying on.	Liva: Is this a major issue for you? C1S: No, because we don't rely on that many third parties.

						<p>those key users become an ambassador to the rest of the organization. And setting up this key user organization, and not only for the purpose of introducing, but also later to actually kind of capture how things are going, what are the issues, introducing new features... That is something that we would be very structurally, very methodologically were doing within both large customers. And not like OK, do a demo and say OK, this is what you can do - bye. If you have a question, let us know. I really take them by the hand, do real life use cases, using the actual tooling and then deploy it further and have these key users really participate in also presenting and sharing and teaching others. I think that that is the only way you really can do it. And unfortunately, even today in my company we create, let us say we build solutions internally, you always see that at the end the introduction and deployment to the users is forgotten, even though at the beginning we say OK, watch it, take care of it, plan it. It is not happening because most</p>	
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						people think, OK, we build it and then we are done.	
Owner	SLR	PBE Innovation	Innovation	Innovation acceptance	P1DA: It's a common problem, and for platform it's the same, but if you really want to get the benefits out of a platform you also need to know how the different components in the platform interact together, because otherwise you're just using a component. And yeah, the actual benefit of the platform is then hardly seen.		
Owner	NEW	Specifics of business model	User organizations	IT Infrastructure	<p>In a certain sense it is a challenge for Microsoft also to accelerate applications and higher speeds for communication. But mostly it is on the user side or the company site. For instance, if you want to work wirelessly then you need to make sure that your wireless network is really good. And for instance, at one customer the wireless network was so bad that in certain places there was no wireless. So that the people were walking to a meeting room and they expect that they could connect and they couldn't connect.</p> <p>Liva: Oh so actually you trying to implement the tools on the customer site were experiencing the IT constraints of your customer, of the user organization as a roadblock in actually getting your product implemented?</p> <p>P1DA: Exactly! But it also meant that because we experienced it once, that the next time when we started the project with the customer, we from the very beginning focused on the infrastructure. So not only on platform functionality but also the infrastructure needed to perform well. And we even included the interior, so how meeting rooms were done. So just have screens everywhere, have communication devices everywhere, which nowadays is kind of common</p>	<p>No, we knew kind of what was needed. And so those kinds of requirements we shared with the customer, with the customer IT people we would investigate how they could best be realized. For instance, measuring the strength of the wireless connections. We are looking at that, and if you do a video call, it requires quite a lot of bandwidth so and you can set how much bandwidth you can reserve for video, for audio, for data. So, in that way you can also influence... there are very specific technical parameters you can set an influence performance and those things. So, let us say advice to the customer.</p>	

Owner	Refinement	PBE Innovation	Innovation acceptance and	Innovation acceptance	<p>But a lot can be added and will be added in the coming years. The challenge is of course, is to again how to use it and find the right kind of value? And what do people accept? If you if you want to do a virtual reality meeting, then you need to take like a game Helmet, but then you do not see anything. You are in virtual reality. And then you can go to the like Google Glass or the whole lens where you can look through so that is already there. Mixing a meeting with people sitting in a room and other people not sitting in a room, but you see them through your glass as well as if they are sitting in the room, Yeah, that is the kind of challenge that that for these kinds of applications is now being investigated and starts to being deployed.</p>		
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						Microsoft platform to SAPs platform or to another platform. Does Microsoft need to invest in those connections, those interfaces? So then, as the CEO of Microsoft, that's what you would do.	
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[illegible]

						<p>P1DA: Yeah, depends on what level. Not on the highest level. Yeah, for instance on a very high level between Phillips and the Microsoft. Phillips had an ecosystem defined and Microsoft was one of the players in that ecosystem like Oracle like SAP. Yeah, and twice a year they organized; Phillips organized a meeting with the representatives of the other layers. And Microsoft is kind of doing this similar thing, and there they invite the representatives of the biggest companies or biggest partners. And then they organize it so. It is more like making sure that there is still willingness on both sides to invest in the joint developments.</p>	
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Owner							
SLR							
Ecosystem Governance							
Ecosystem Relations							
Ecosystem Relations					<p>Not that many, I think during the introduction of Yammer, there was one. Where the people from the Yammer company, they were not feeling comfortable. Because they had no clue at the beginning on what their role would be, they had no clue whether or not the product would remain or just be integrated as the functionality in Microsoft Solutions. Yeah, so in this case that was a lot of uncertainty on this side with that company that became part of the Microsoft ecosystem.</p>	<p>Yeah, by having at least top management clearly involved and also clearly stating that they are confident in what's being done. So increasing the trust in them and also providing indeed transparency on how it would be done, how would the company be integrated in the ecosystem? How would be Yammer in the end be integrated into the platform.</p> <p>But back to the challenges I think indeed change management and again building up trust and being very transparent in why you are doing things. And when you are doing things, I think that is really important.</p>	

Owner	SLR	Ecosystem Governance	Regulatory	Regulatory	<p>P1DA:</p> <p>This is also change management really. And if you look outside Microsoft platform itself. Take Yammer as an example. If a German company uses Yammer... a company using Yammer can monitor kind of what is happening between different people in different functions: the interactions, and such. If you also use the for instance the like button, you like a conversation or you like a statement - again, that can be analyzed, and it can actually be used to see how many statements of the person were liked. And this can be used in the yearly review. And that is the kind of thing that the German work councils are really, really focusing on it. The Netherlands is not an issue, but in Germany - even the possibility that the management can monitor what an employee is doing it is forbidden. So everything in the platform or in the tool that is used will be needed to be removed. So Microsoft needed to remove the like function in Yammer in order for a big German company to accept it.</p> <p>It is a very small thing, but it was a very important thing because without it, it would not have been possible to introduce it. So that is not, yeah it depends on ecosystem. This is between Microsoft and then the company and the company and its workers. It was something that we had to deal with.</p>		
Owner	Refinement	Ecosystem Governance	Ethical challenges	Ethical challenges	<p>There is actually one case. And you might also know this - Microsoft also bought Nokia. Microsoft was developing their mobile platform, their mobile phone. That did not go very quickly, so so at this moment in time they bought Nokia. And they just bought part of Nokia, not Nokia factories, but to Nokia engineering design? And then after a year or two, they just stopped the whole mobile development. And yeah, all of a sudden those people still had a job, but they had no longer a product. Yeah, these people went back to Nokia or started their own companies. So yeah, not really a very ethical thing to do.</p>		

						<p>this, and it's much easier to just pay taxes where it's cheapest, and then they also want to change this. Invoices need to be done and booked in the country that they originate. Now that is just really a tough thing if Microsoft but also others need to do that. If there is regulatory, you have to. Because otherwise at a certain moment you are not allowed to operate</p>	
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Owner	
SLR	
PBE Innovation	
PBE/Product innovation	
PBE/Product innovation	<p>Yeah, I think the challenge is to be proactive. Really to be one of the first to identify the new opportunities.</p> <p>Huge investment in research. But also trying to think out of the box of what might become something in the near future. So that's something Microsoft really invested heavily in. Then they have small startups within Microsoft itself, often called garage. And in those garage they have the freedom to develop something that they think might be of value to Microsoft. It can be added to the platform. So Microsoft is an investor in those garage and those garage provide new features, new functionality's or sometimes even new technology. And if it makes sense, then Microsoft picks it up and if it is better - then integrates it into the platform. If it takes too long or if some other party has invented something that is really awesome- just buy the company. in VR there is like an open platform that people can go into and meet one another in a virtual reality space. Go out for drinking or do gaming or whatever. Microsoft was developing it themselves, but they bought a company and they integrate it in the in the new mesh platform. This VR</p>

						<p>platform is built and connected to Azure and it will connect again to office and then these solutions will become available also to the businesses to companies. So then instead of using teams, you can use this virtual reality kind of meeting. That is how Microsoft evolves and stays the most innovative company. There are always smaller companies that are even more innovative, but if they are successful they will be bought by Microsoft or Google or Facebook, or Amazon. Another one. Working closely with universities and investing in research programs in universities. Then there is also something that Microsoft is really doing a lot and heavily. They really do a lot. So, they invest millions in Delft University in this computer thing, the next way of how to compute. Similarly in other countries.</p>	
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Owner							
SLR							
PBE Phenomena							
Platform dynamics							
Platform dynamics				Yeah the locked in phenomena. Microsoft engages with a company and proposes to use Office 365 or Dynamics, then there are people within the company to say hey, but if we go to Microsoft and we are going to use everything they provide at a certain moment in time, we can no longer do without them. And that is something that that is not so much anymore. But it like 10 years ago that was quite often. When Microsoft said OK, you need to step into Office 365, people were saying hey, but why should we? Because if we do, then we're bound to you. At this moment in time, also because the most of the platform services are now cloud based and you can more easily... well not as a company, but as a private user you can easily say OK I will pay a few months for Office 365, for next month I quit and I go to Google. For a company that's not that easy because your invested in training and also connect your other things to the platform. So this lock-in is still there really. It is accepted by the companies, so they really accept that they have a very strong dependency on Microsoft. And vice versa - Microsoft on them as well. Bigger companies could then use this to have influence on what Microsoft is doing. The smaller ones cannot do that.	But Microsoft is aware of it and they said they address it. So if you really are going to sit down with Microsoft and say OK, we no longer want to make use of your platform. You wanna migrate to something else. Then it's possible and they kind of will support in doing it, but it rarely happens. Just by convincing them of the benefits, and on the other side, also trying to build trust saying OK - if there is a moment you want to get rid of us, we will not prevent it and your data won't be gone. Just build trust that even if they want to quit, they can still do it. But it can be done. This is how it is being addressed.	No, I think it is becoming less and less. I think that it is important because of the way the solutions are built and based on cloud and also because the solutions are... we had like really monolithic solutions and if it was called the platform quite often it was more like 1 big monolithic application. Now more and more the different functions, components are more loosely coupled to the underlying platform. And that enables also for Microsoft to connect much easier to SAP or for SAP it is much easier to connect to Microsoft because the mechanism to connect to a platform are kind of similar. And an SAP component can much more easily be connected to Microsoft platform than 10 years ago. And it evolved. It becomes even more and more, all companies are working to breakdown the big applications into smaller ones that can be connected to one another and also replaced. This makes the evolution easier because you do not need to take out a big chunk. You can take a smaller one out. Replace it by something more modern or even new. And then because it connects, that becomes available all of a sudden to everyone. Yeah, if you look the evolution of teams	

							and the fact that every couple of months, you have new features in teams. 10 years ago, that was quite impossible to do. If you do not want teams, you might even go to Webex and say – I want Webex in and then Webex provide similar features and connects to your Microsoft platform. q
Owner	Refinement	PBE Phenomena	Platform startup phenomena	Platform startup phenomena	<p>v\that's an interesting perspective, because normally you look at the subject from the perspective of the whole ecosystem. But indeed, it could be an issue that is experienced. These are challenges could be experienced by a specific functionality of the new feature of the platform. Did you experience a specific situation where a solution had these problems of adoption?</p> <p>P1DA: Yeah, I'm not sure if it's the right example. Let's say a company, wants to protect its documents top secret and Microsoft offers a platform to share that information with others. So then you want to share top secret information and using share point for instance. But you want to make sure that that only users that have the authorization can look into this. Within one customer environment you can ensure that, but the moment someone in another company has access to the to the same SharePoint. Yeah, how do you prevent that someone is getting the data that's allowed and then share it again internally in the other organization without us. For that Microsoft doesn't have a solution. There are solutions in the market that provide this. And then the question is OK, who's taking the lead in making it possible for this specific functionality to be to be included in in the platform? It's a good example of things we struggle with. I'm not sure if it fits here.</p>		

Owner						
Refinement						
Competition						
Competitive thinking						
Competitive thinking					<p>Microsoft, of course, had for communication had Skype and then they bought Yammer. The idea was actually to merge Skype and Yammer into one solution. Instead, a third solution was developed, being teams. It's still a challenge because Skype merged into teams now. Yammer is still there but yeah, for how long? Because what is the added functionality of Yammer compared to teams and won't you be much happier if Yammer would be in teams? And within Microsoft Skype had a development team, Yammer had a development team, Teams have a development team. Three teams competing. And in the end Teams are getting stronger and stronger. Yeah, but that's I think a good example of what happened and that indeed competitive thinking and positioning within Microsoft for the platform was really happening.</p>	

Appendix 8: SLR Actor perspectives

An overview of challenge sub-categories per perspective: Figure 7.

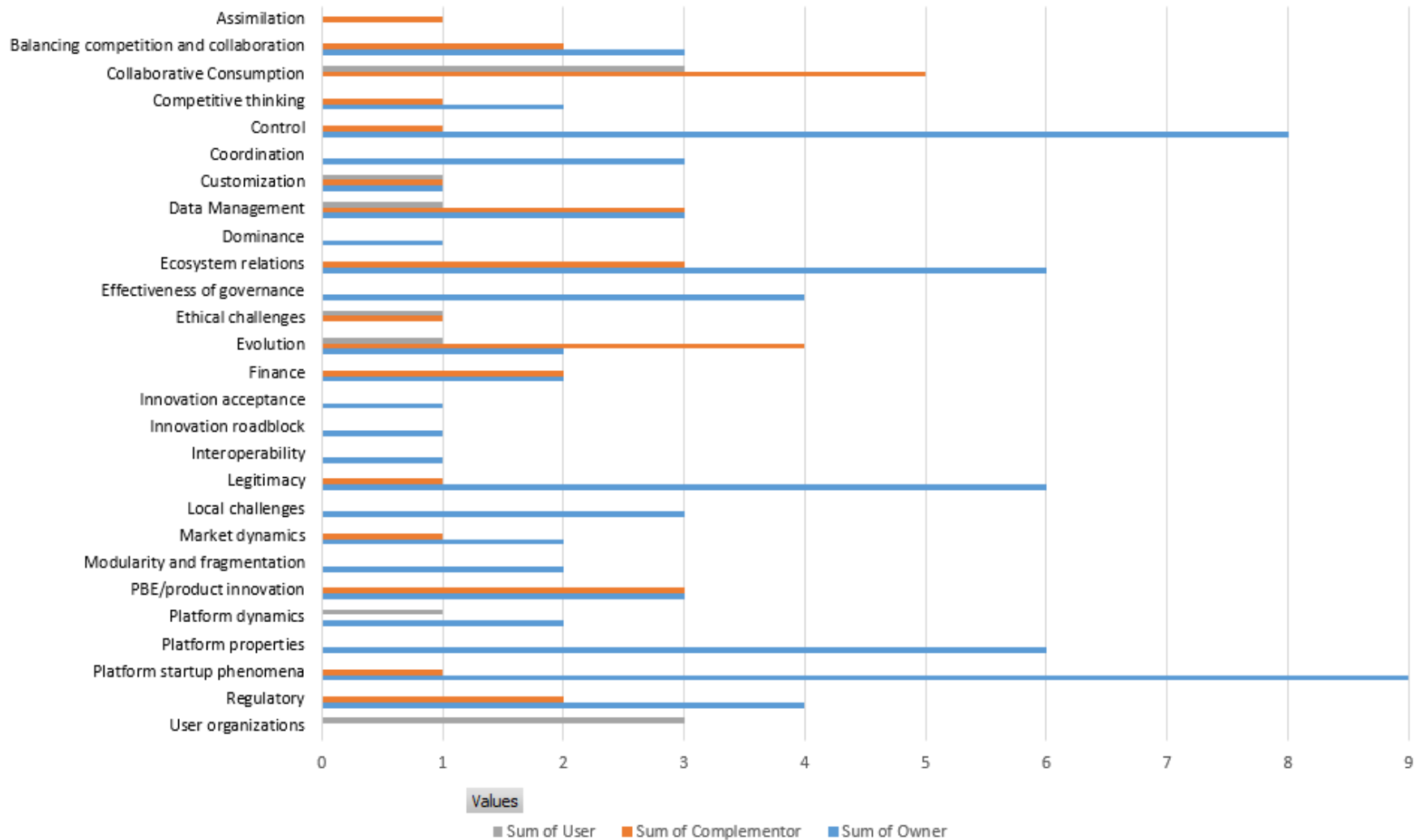


Figure 7: Overview of subcategories of challenges per actor perspective

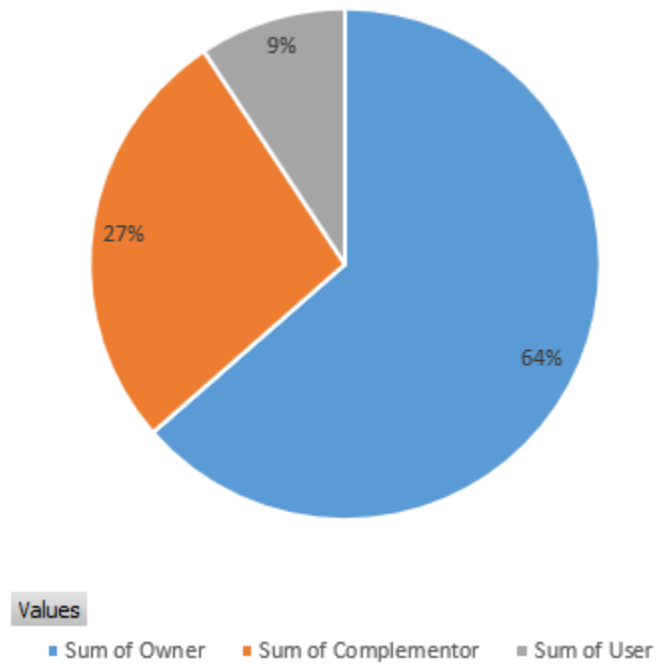


Figure 8: Overview of the proportion of different actor perspectives in the identified challenges.

Appendix 9: Interview data analysis and interpretation

Table 7: Instances of recorded challenges per respondent

Category	Subcategory	U1IT	U2BU	U3BU	U4BU	C1S	P1DA
Architecture	Interoperability	1	1	1	NA	1	NA
Architecture	Customization	1	1	4	NA	1	NA
Architecture	Modularity and fragmentation	2	NA	1	NA	1	NA
Competition	Competitive thinking	0	NA	NA	NA	0	1
Competition	Assimilation	0	NA	NA	NA	3	NA
Competition	Balancing competition and collaboration	0	NA	NA	NA	1	NA
Competition	Dominance	0	NA	NA	NA	2	NA
Ecosystem Governance	Control	3	1	4	0	1	0
Ecosystem Governance	Coordination	1	2	1	0	2	1
Ecosystem Governance	Data Management	0	1	0	1	0	0
Ecosystem Governance	Ecosystem relations	0	0	0	0	0	1
Ecosystem Governance	Effectiveness of governance	2	0	0	0	0	1
Ecosystem Governance	Ethical challenges	0	1	0	1	0	1
Ecosystem Governance	Finance	0	0	0	0	1	0
Ecosystem Governance	Regulatory	0	0	0	1	0	2
PBE Innovation	Innovation acceptance and adoption	0	1	NA	2	2	3
PBE Innovation	Innovation roadblock	1	NA	NA	NA	0	NA
PBE Innovation	PBE/product innovation	1	NA	NA	NA	2	1
PBE Phenomena	Evolution	2	1	2	0	3	0
PBE Phenomena	Legitimacy	0	0	0	0	1	0
PBE Phenomena	Platform dynamics	0	0	1	0	1	1
PBE Phenomena	Platform properties	0	0	0	NA	1	0
PBE Phenomena	Platform/functionality start-up phenomena	0	1	0	NA	1	1
Specifics of business model	Collaborative Consumption	0	0	0	0	0	NA
Specifics of business model	Local challenges	1	1	1	2	1	NA
Specifics of business model	Market dynamics	0	1	0	0	0	NA
Specifics of business model	User organizations	5	4	7	9	1	1

Table 8: Weighted data

Category	Subcategory	Sum of respondents			Weight			Weighted result		
		U	C	P	U	C	P	U	C	P
Architecture	Interoperability	3	1	0	0.166667	0.5	0	0.5	0	1
Architecture	Customization	3	1	0	0.166667	0.5	0	0.5	0	1.5
Architecture	Modularity and fragmentation	2	1	0	0.25	0.5	0	0.5	0	1.25
Competition	Competitive thinking	1	1	1	0.33	0.33	0.33	0	0.33	0.33
Competition	Assimilation	1	1	0	0.5	0.5	0	1.5	0	1.5
Competition	Balancing competition and collaboration	1	1	0	0.5	0.5	0	0.5	0	0.5
Competition	Dominance	1	1	0	0.5	0.5	0	1	0	1
Ecosystem Governance	Control	4	1	1	0.0825	0.33	0.33	0.33	0	0.99
Ecosystem Governance	Coordination	4	1	1	0.0825	0.33	0.33	0.66	0.33	1.32
Ecosystem Governance	Data Management	4	1	1	0.0825	0.33	0.33	0	0	0.165
Ecosystem Governance	Ecosystem relations	4	1	1	0.0825	0.33	0.33	0	0.33	0.33
Ecosystem Governance	Effectiveness of governance	4	1	1	0.0825	0.33	0.33	0	0.33	0.495
Ecosystem Governance	Ethical challenges	4	1	1	0.0825	0.33	0.33	0	0.33	0.495
Ecosystem Governance	Finance	4	1	1	0.0825	0.33	0.33	0.33	0	0.33
Ecosystem Governance	Regulatory	4	1	1	0.0825	0.33	0.33	0	0.66	0.7425
PBE Innovation	Innovation acceptance and adoption	3	1	1	0.11	0.33	0.33	0.66	0.99	1.98
PBE Innovation	Innovation roadblock	1	1	0	0.5	0.5	0	0	0	0.5
PBE Innovation	PBE/ product innovation	1	1	1	0.33	0.33	0.33	0.66	0.33	1.32
PBE Phenomena	Evolution	4	1	1	0.0825	0.33	0.33	0.99	0	1.4025
PBE Phenomena	Legitimacy	4	1	1	0.0825	0.33	0.33	0.33	0	0.33
PBE Phenomena	Platform dynamics	4	1	1	0.0825	0.33	0.33	0.33	0.33	0.7425
PBE Phenomena	Platform properties	3	1	1	0.11	0.33	0.33	0.33	0	0.33
PBE Phenomena	Platform/functionality start-up phenomena	3	1	1	0.11	0.33	0.33	0.33	0.33	0.77
Specifics of business model	Collaborative Consumption	4	1	0	0.125	0.5	0	0	0	0
Specifics of business model	Local challenges	4	1	0	0.125	0.5	0	0.5	0	1.125
Specifics of business model	Market dynamics	4	1	0	0.125	0.5	0	0	0	0.125
Specifics of business model	User organizations	4	1	1	0.0825	0.33	0.33	0.33	0.33	2.7225