FROM DRIFT TO CENTRAL GUIDANCE: A PATH CONSTITUTION PERSPECTIVE ON THE PLATFORMIZATION OF AN INFORMATION INFRASTRUCTURE

Research paper

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Abstract

Responding to competitive pressures arising from digitalization, traditional companies are increasingly turning towards platform strategies to gain speed in the development of digital value propositions and overcome rigidities of pre-existing information technology landscapes. Based on a case study of the LEGO Group's digitalization journey, this paper elaborates how brick-and-mortar companies can break away from a drifting information infrastructure and trigger its transformation into a digital platform. The case analysis conceptualizes information infrastructure evolution as a path-dependent process and develops a process model on the creation of a new 'platformization' path through mindful deviations by architects that guide collective action. This perspective depicts the transformation journey as a process of socio-technical path constitution that is shaped by deliberate human interventions and emergent forces from path dependencies.

Keywords: *Information Infrastructure Transformation, Digital Platform, Path Constitution, Path Dependence*.

1 Introduction

While information technology (IT) has traditionally occupied a supporting role for organizations, new business models emerge that have digital components inseparably inscribed into their value proposition (El Sawy 2003). The economic and societal shift towards this digital paradigm is commonly referred to as "digitalization" (El Sawy et al., 2015, p.2). Companies that are able to capture the moment can seize opportunities from new ways of doing business, but the disruptive forces of digitalized business models also pose enormous threats on incumbent firms. Particularly traditional manufacturing industries are facing the danger of having well-established business models disrupted by digitally enabled products or services from the network economy. Incumbents are therefore embarking on digital transformations to inject digital technology into their physical products, gain the agility to develop new products as well as services quickly, and leverage business ecosystems of digital partners for co-creation of value (Matt et al. 2015).

At the heart of this digital transformation rests an increased orientation towards digitally enabled platform-based business models (Cusumano and Gawer 2002; Eaton et al. 2015; Eisenmann et al. 2011; Gawer 2014; Tiwana 2013). The platform is the third elementary type of value configuration, as identified by Stabell and Fjeldstad (1998), and platform markets comprise a large and rapidly growing share of the global economy (Eisenmann et al. 2011). Responding to competitive pressures from digital natives, traditional brick-and-mortar companies are nowadays equally adopting digital platform strategies (Ross et al. 2016).

However, little is known in the academic literature on how digital platforms come into being or how they are constructed (de Reuver et al. 2016). Simultaneously, companies' IT trajectories are subject to path dependencies and irreversibility that complicate corporate IT platform innovations (Fichman 2004). Consequently, addressing this phenomenon requires an insider's perspective on how such dependencies can be overcome to create new development trajectories for corporate IT landscapes. This paper therefore presents a case study to elaborate how the LEGO Group is constituting a new 'platformization' path to gradually transform the company's information infrastructure. Thereby, the study sheds light on the following research question: *How can a company trigger the transformation of its drifting information infrastructure into a digital platform?*

The remainder of this paper is structured as follows: First, the academic literature on digital platforms, information infrastructures, and path constitution is revealed. Then, a recap of the LEGO Group's ongoing digitalization journey and the case evidence expose how the brick manufacturer is re-architecting and transforming its information infrastructure into a digital platform. The subsequent analysis develops a path constitution perspective on this process. Eventually the paper closes with findings and conclusions.

2 Theoretical Background

2.1 Information Infrastructures and Platforms

The academic literature on technological platform management mainly consists of two separate research strands that a small, emerging body of research is beginning to bridge. On the one hand, the economic theoretical perspective has conceptualized platforms as two-sided markets and has produced insights on platform competition (Gawer 2014; Thomas et al. 2015). The majority of platform research within the context of information systems (IS) follows the technological engineering perspective, on the other hand, which studies platforms as technological architectures that drive platform innovation (Gawer 2014). Conceptualizing a platform as a stable core and variable peripheral components, this research strand explains how modular architectures spur organizational agility by providing a technological architecture to innovate upon in production and design (Ghazawneh & Henfridsson 2013; Selander et al. 2013; Gawer 2014; Eaton et al. 2015).

More recent evidence suggests that firm-internal enterprise platforms and infrastructures, such as enterprise resource planning (ERP) systems, play a key enabling role in leveraging digital technologies for innovation (Sedera et al. 2016; Lokuge & Sedera 2016; Henfridsson & Bygstad 2013). Particularly ERP systems "are increasingly serving as a platform to which other tools can be added in order to take advantage of shared data resources" (Yoo et al. 2012, p.1400). Sedera et al. (2016), on the other hand, reveal that not all enterprise platforms are suitable to support digital platform innovation and their impact remains unclear (Sedera et al. 2016; Jansen et al. 2006; Damanpour 1991).

The concept of an information infrastructure (II) is to a large extent overlapping with the one of a platform and has therefore often been applied to study similar phenomena (c.f. Tilson et al., 2010). Both concepts describe shared socio-technical systems that consist of a set of IT capabilities, are emergent in nature, and evolve in a path-dependent nature to serve initially unknown user needs (Hanseth & Lyytinen 2010). Nevertheless, a platform and an II are distinct phenomena that exhibit decisive differences. Platforms are built into a design context, which remains under central control by architectural principles that form a design framework (Hanseth & Lyytinen 2010). In a similar vein, Baldwin & Woodard (2008) argue that a platform is constituted by a common architecture containing specific design rules that create a modular architecture. As a result, a platform entails a core of stable modules and a periphery containing components that are more variable over time (Baldwin and Woodard 2008). II, by contrast, are unbounded, open, shaped by heterogeneous and autonomous actors, and lack global control (Star & Ruhleder 1996; Henfridsson & Bygstad 2013). Also, II are more heterogeneous in nature and serve the connectivity of disperse communities. Hanseth & Lyytinen (2010, p.1) argue that II are "recursively composed of other infrastructures, platforms, applications, and IT capabilities".

The development and evolvement of II bares an idiosyncratic coordination challenge (Grisot et al. 2014; Hanseth & Lyytinen 2010), which originates from the fact that most IIs are distributed across a diverse set of actors who develop II "in modular increments, not all at once globally" (Star, 1999, p.382). Therefore, lack of control is a fundamental attribute of II development (Ciborra 2000). In the pursuit of individual goals, distributed actors leverage parts of the II's pre-existing components – referred to as the installed base (Grisot et al. 2014) – to append new socio-technical elements (Sanner et al. 2014). Simultaneously, it is rarely possible to redesign the II from scratch, II development consequently always "wrestles with the inertia of the installed base and inherits strengths and limitations from that base" (Star & Ruhleder 1996, p.113).

In recognition of these constraints, II development has been framed as 'installed base cultivation', which denotes the incremental modification of the installed base until it comes as close as possible to a desirable scenario (Hanseth 1999). Accordingly, most extant research on II development tends to see path dependence as a near-inexorable force on the development trajectory, leaving incremental, path-deepening innovation as the only option for development.

2.2 Path Constitution

Within the general path dependence literature (c.f. Sydow et al. (2009) and Vergne & Durand (2010)), this perspective corresponds to the phenomenon of path-dependent processes that are non-ergodic – processes that are "unable to shake free of their history" (David, 2001, p. 19). The conceptualization is built around an understanding of phenomena as being driven by mutually interacting variables that generate feedback loops and nonlinear dynamics (Maruyama 1963; Masuch 1985; Stacey 2007). Consequently, this perspective entails an 'outsider's view' that neglects the active engagement by human actors as path evolution is determined by contingencies and cannot break out unless exogenous shocks occur (Sydow et al. 2009).

The concept of path creation, on the other hand, takes an 'insider's' view on path-dependent processes (Garud et al. 2010) and stresses the active involvement of agents driven by 'a logic of control' in shaping the evolutionary path (Garud & Karnoe 2001; Sarasvathy 2001; Karnøe & Garud 2012). Agency is distributed and emergent through the interactions of actors and artefacts that constitute action nets (Karnøe et al. 2008).

At the heart of path creation lies a process of mindful deviations by embedded agents "from existing artifacts and relevance structures fully aware that they may be creating inefficiencies in the present, but also aware that such steps are required to create new futures" (Garud & Karnoe 2001, p.6). Consequently, innovation trajectories are less deterministic than assumed by the path dependence view.

Integrating the two perspectives, Meyer & Schubert (2007) as well as Sydow et al. (2012) introduce the notion of path constitution to account for the entanglement of history and human agency in the process of technological innovations. Both contributions define a path as a non-ergodic process of interrelated events through which one of multiple initially available options gains momentum such that the entire process may lead to a lock-in – even though the eventual solution was not predictable at the beginning of the path. Processes involved in a path may be partly or entirely influenced by knowledgeable human actors (Sydow et al. 2012; Singh et al. 2015), but are independently characterized by irreversibility, momentum, and potentially lock-in situations (Sydow et al. 2012).

Additionally, Singh et al. (2015) reveal that path trajectories are shaped by sequences of reinforcing and transforming episodes that determine if a path eventually results in a lock-in or not. While reinforcing episodes continuously reduce the availability of options, transforming episodes make additional options actionable and thereby contribute to the prevention of lock-in situations (Singh et al. 2015).

3 Research Method

The research presented in this paper adopts a case study approach (Dubé & Paré 2003; Yin 2013) to develop a process model of how a company can re-architect its II to trigger the constitution of a new platformization path. The goal is not to develop testable hypotheses about the future, but to elaborate how and why phenomena occurred and provide "an altered understanding of how things are or why they are as they are" (c.f. Type II, Gregor, 2006, p.624). Such explanatory findings may be suitable to inform normative theories in the future. Since the inquiry investigates a rare phenomenon in a particularly fine-grained level of detail, a single-case design is suitable to produce significant research results (c.f. Dubé and Paré, 2003).

Recognizing the lack of previous research on how incumbent companies in traditional industries can develop digital platforms, we searched for a case that could enable in-depth exploration of the process this transformation entails (e.g. Patton 1990). The platformization initiative in the LEGO Group seemed to be such a situation because it includes several of the typical characteristics associated with how the challenge commonly is portrayed: an IT landscape that was originally crafted to have a supporting role enabling the company's core business activities; a rapidly transforming environment where existing and new competition embrace digital technologies to reinvent offerings, customer interactions, processes as well as complete business models; and a spurring awareness of the transformational need that had created financial resources and managerial attention to potentially progress the company towards the objective of a business enabled by a digital platform. Importantly, the LEGO Group is known as an industry leader in digitalization (El Sawy et al. 2015) and generally considered a healthy as well as well-functioning company. As such, there was an initial prospect to explore a well-run company that made substantial investments to achieve a particular target state and to reflect on the experiences of this journey.

For this purpose, the study was designed to initially cover a broad scope and was based on the collection of empirical data to allow for a partially inductive understanding of the transformational process. Data was collected from three sources of evidence: observations, documents and interviews. Direct participant observation data (c.f. Yin, 2013) was collected by one of the authors that for twelve months acted as an integrated member of the LEGO Group's Enterprise Architecture management team on site at the group's headquarters in Billund, Denmark. Observations focused on the actions, decisions, and events through which the transformational process unfolded. Observation data and information about relevant supporting material (documents), were captured in a structured diary (c.f. Naur, 1983; Baskerville and Wood-Harper, 2016). The diary entries were collected in a case database and each grouped by direct observations, reflections on observations, plans for future research, and supporting diagrams, drawings, or mind-maps. As Baskerville and Wood-Harper (2016) point out, "data validity

is a problem in these techniques, partially because of the interpretive nature of the data, but also because of the intersubjectivity of data capture". The research subjects are not only observed, but actively influenced by the researcher. To address this threat to validity, ten semi-structured interviews with key informants are used as a secondary source of evidence (c.f. Ritchie et al., 2013; Yin, 2013). The interviews were conducted on the company's premises and supported by an interview guide containing open-ended questions. The informants mainly include Enterprise or Solution Architects as well as senior stakeholders, such as Vice Presidents of Corporate IT. All interviews were recorded, transcribed and added to the case database (Yin 2013). For the purpose of further triangulation, internal documents from the company, such as reports, presentations, emails, and architecture documentation, are used as a third source of evidence (c.f. Yin, 2013).

We coded the data in two broad phases, with distinct objectives. The first phase of coding aimed to capture the event time series of the transformational initiative. Coding categories were generic process codes (Van de Ven & Poole 1995), including events, actions, decisions, outcomes, and states. To determine concepts (such as invention, capacity and frustration, and network) and their properties (e.g. efficient/inefficient, success/failure) in events, actions, decisions, outcomes, and states, we applied an open coding procedure. The authors jointly coded the data, identifying initial concepts and higher-level categories using a constant comparative method (Corbin & Strauss 1990) and resolving any disagreements through discussion (Saldana 2009). The outcome of this coding phase was an event sequence outlining the unfolding of the initiative with an unstructured list of concepts that seemed to be relevant in the process.

The initial findings, triggered a second phase of more coding as well as additional data collection targeted at the emergent concepts of importance. In the second phase, we approached the initiative as a theoretical issue extending and challenging our findings. Stimulated by the emerging event sequences around the path-dependence of the existing IT setup and LEGO Group's attempt to address this by introducing new architectural principles to adjust the direction of work, rather than embarking on an extensive transformational program, we turned to the relevant literatures for focal categories of coding. The main focal categories included the company's IT setup, evidence of path dependence as well as creation, and mindful deviations in the form of actions. These categories allowed us to systematically relate the various concepts of the initiative produced in the open coding phase. The emerging themes spurred a new literature search for theoretical arguments, explaining the findings in relation to the II and digital platform literatures.

Finally, we used our empirically induced findings and supportive theoretical arguments to create an initial case narrative and a timeline for the development process by tracing the order of events and underlying mechanisms. The narrative is supported with interview quotes for the corresponding concepts of interest to increase its vividness and transparency. Eventually, members of the initiative assessed the representativeness of the findings in our narrative (c.f. Yin, 2013). Largely, the perception concurred with our emergent explanation, revealing the need for only marginal adjustments to the narrative.

4 Case Evidence

As one of the first brick-and-mortar companies in the world, the LEGO Group has made it a top management agenda to leverage digitalization as a fundamental pillar of the overall business strategy. To meet present and upcoming challenges, the long-term vision is to create a highly adaptive organization, which collaborates closely with external partners to harness an ecosystem of platforms to co-create value.

As the implementation of this agenda resulted in several "digitalization moves" (El Sawy et al., 2015, p.2), which placed heavy demands for novel functionality on the enterprise IT platform, the need for a new complementary IT platform soon became evident. An Enterprise Architecture (EA) Director explains: "We have a fairly complex landscape, but still […] one big system […] which is being used all over the globe. […] We have global processes, global solutions. That brings in a lot of advantages that things are integrated and tied together, but […] because of this huge, tightly integrated, tightly coupled

solution, we have difficulties with reacting fast" (EA Director, Corporate IT, LEGO Group). Business processes have been standardized and integrated to a large extent on non-redundant, global enterprise platforms that enable efficient operational transactions. The tight coupling between systems, however, undermines IT flexibility as change requests and upgrades imply ripple effects on other landscape components.

This platform architecture results from the fact that architectural decision-making in the LEGO Group has previously not been managed from a global perspective to focus on the long-term flexibility and evolvability of the system landscape. Over the years, the existing IT principles had largely grown obsolete and other influencing constraints, such as cost or functional requirements, have often been prioritized over architectural considerations. Therefore, design decisions did often not follow a coherent architectural framework and were largely shaped by choices of autonomous departments that were prioritizing local demands.

"We are moving forward very quickly in the more digital space and there were really no principles or no overlying roadmap […]. [This] meant that the decisions were potentially going to be fragmented and the wrong decisions [were] taken for the long term" (Head of Business-Enabling Technologies , Corporate IT, LEGO Group). According to the Head of EA, "there has been wild freedom to operate from an architectural point of view. […] Because we had a distributed EA landscape before, […] nobody took the end-to-end responsibility of those priorities that go across the platform. […] We did have a capability within the organization […] BRMs and what were called EAs, but […] they weren't actually doing EA. They were people doing solution architecture for each of the different vertical areas and there was a complete lack of an overall view of the architectural landscape" (Head of EA, Corporate IT, LEGO Group). At the same time, some design decisions involved "less optimal solutions, because [the architects] wanted to stay within [the] platform. […] I think we got too many solutions that are a little bit artificially engineered, so they fit into what we had and thereby we stuck also to stuff that we know (EA Director, LEGO Group). The company's holistic IT landscape therefore evolved in the form of an II with lack of centralized architectural control.

While the existing enterprise platform is a "rock-solid, carefully designed and thoroughly tested platform" (El Sawy et al., 2015, p.23), a new complementary so-called "engagement" platform was initiated to satisfy the future demand of rapidly adding prototype functionality for innovative digital products and services in an ad-hoc manner. This platform should be rich in digital options and enable the implementation of innovative value propositions without limitations by technical debt (c.f. Woodard et al., 2012). Integrating with the traditional enterprise platform in a loosely-coupled manner, a new digital platform based on micro-services as well as application programming interfaces (APIs) should emerge (El Sawy et al. 2015). Consequently, the platform would also embody the option to open interfaces up for external innovation by ecosystem-partners when appropriate.

4.1 Enterprise Architecture in the LEGO Group

In order to address these issues and trigger the transition from a distributedly-managed II towards a centrally guided digital platform, the LEGO Group has recently established a centralized Enterprise Architecture capability. "When we started to talk in more details about what was needed for the future in terms of direction-setting and governance, it became clear in the leadership team that there was a need [for a centralized EA function]" (Head of EA, LEGO Group). Subsequently, the function was created out of well-experienced former Solution Architects that were re-skilled for the new positions. "We did not bring in new people […], because we needed people who had an internal understanding of our landscape" (Head of Business-Enabling Technologies , LEGO Group).

The new EA function is a small organizational unit consisting of six Enterprise Architects (EAs) and guides the evolvement of the platform landscape with an integrated long-term perspective. "I hope and I already see that we have more time to look ahead and to figure out how we are going to create a platform for the LEGO Group that allows for the flexibility and the speed that we see around us, but also that we see our colleagues in the business asking [for] more and more" (EA Director, LEGO Group). The goal is to build scalable, adaptable and flexible IT platforms that have digital options embedded to

make sure that new technologies can be seamlessly integrated. "We will not let EA or bad architectural choices limit future business opportunities" (Head of EA, LEGO Group). "We will get to a state with a more agile platform […] that will be more [flexible] towards future demands […] and we will optimize the cost of operating what we have" (CTO and Vice President, Corporate IT, LEGO Group).

4.2 Strategic IT Directions

Starting out with these overarching goals, the team's specific strategy and focus areas (c.f. Figure 1), emerged in a cognitive process of sense-making that was shaped by various stakeholders. Most notably, this process revealed the need for long-term strategic directions for data management, internal as well as external integration, and cloud adoption going forward. "It was not called out – to start with – that EA should lead such big initiatives. […] It was first when the team met and we started to talk about what the biggest challenges for our platform are, that it became clear" (Head of EA, LEGO Group).

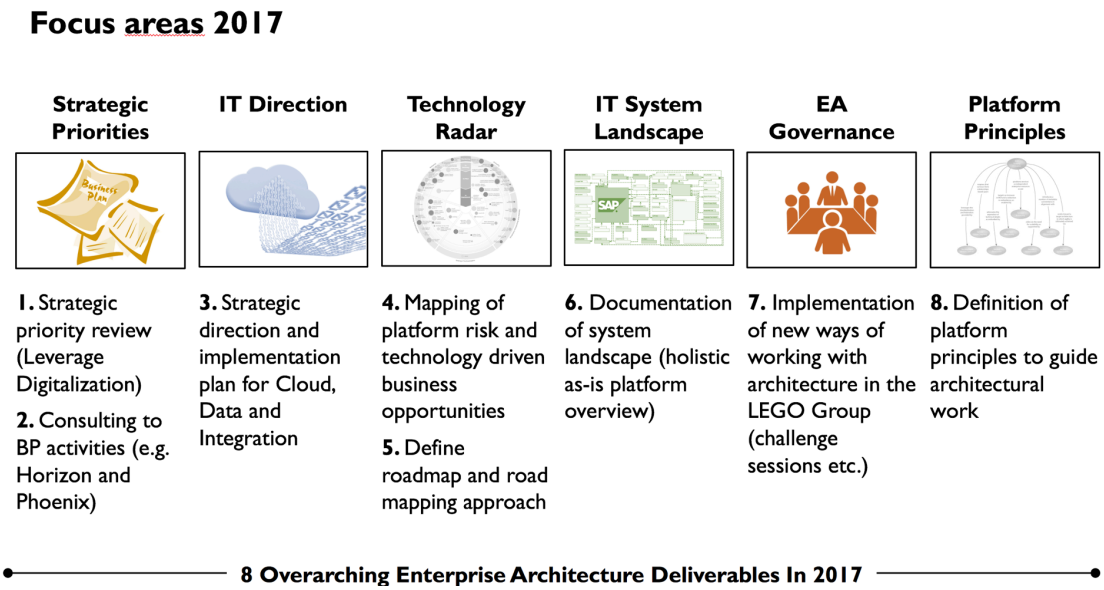

Figure 1. EA Focus Areas 2017 (Source: the LEGO Group)

"Most companies that are in the retail or consumer-facing sector are very much moving away from that monolith concept and towards the whole idea of micro-services and contact solutions" (Head of Business-Enabling Technologies, LEGO Group). In contrast to the management of large-scale enterprise systems, the challenge for IT departments in the digital age will rather be the identification, implementation, and composition of specialized services and modules to support desired value propositions. Along with this paradigm shift, also the tasks and responsibilities of the EA function are changing. For the IT organization to gain agility, Solution- and Application-Architects will need to operate in close collaboration with business stakeholders and require autonomy to build or compose specific solutions with minimum constraints. "That is where the EA role becomes so critical in terms of setting the right principles and ensuring that what we do gives people or technology the freedom, but is done in a way that is right for the organization long-term. So, I think it becomes a more important role" (Head of Business-Enabling Technologies, LEGO Group). Therefore, the EA function needs to manage the paradox between generativity and control, which the academic literature mainly identifies in the context of platform ecosystems (Yoo et al. 2010). "And that is where the EA role becomes so critical in terms of setting the right principles and ensuring that what we do gives people or technology the freedom, but is done in a way that is right for the organization long-term. So, I think it becomes a more important role" (Head of Business-Enabling Technologies, LEGO Group).

Consequently, the EA team decided to not only manage and govern the platform architecture going forward, but also lead the platform direction by elaborating long-term strategies integration, cloud adoption, and data. The development and implementation of these strategic directions is primarily an organizational, rather than a technical, challenge as the EAs have to convince key stakeholders of the expediency and feasibility of strategic architectural choices. "As an EA, you often need to convince a lot of people[,] stand up for things [and] have a certain power-base" (CTO, LEGO Group). This journey requires careful stakeholder management within the organization based on powerful storylines, the demonstration of value from new technologies, but also the adaptation of own ideas towards constructive outside opinions. A Senior EA describes the challenge of spreading strategic architectural directions within the company's IT department: "They need to catch fire. […] We have to change the mindset not with a big bang, but more: 'See what we have found! Do you agree?' […] not just because it is something new, but because we actually strongly believe that it is something that can make us even more agile" (Senior Enterprise Architect, Corporate IT, LEGO Group).

4.3 System Landscape Documentation

In addition, the EA team has elaborated a documentation of the LEGO Group's entire system landscape that provides a clear picture of the as-is situation, demonstrates the complexity of the system landscape, and is currently leveraged to communicate the criticality of a new architectural direction to senior management and all relevant stakeholders. In the future, this landscape documentation will mainly provide a basis to track the platform's state and elaborate the transition path towards the target platform architecture. The CTO explains: "Sometimes we all live in our small silos and we forget how much stuff we have actually put together […] In order to get anywhere, you need to know where you are. So creating an as-is picture is absolutely necessary in order to know, where would we be heading […] If you just talk about the future all the time, people will say 'Good show, that is fun to hear. Let's go back to reality and do our daily work!'. Then you become this paper-tiger, which is a threat for all architects" (CTO, LEGO Group).

4.4 Engagement with the Architecture Community

The strategic directions will remain fruitless, if not taken to life in the organization. For that purpose, the EA function's design has been rooted in an architecture community of Solution- and Application-Architects that will implement strategic directions in concrete architectural designs and thereby expose the EAs to some of the actual decision-making. "We created this kind of hybrid organization [...] which meant that the architects were still rooted in [the delivery of technology] and could not become too ivory tower" (Head of Business-Enabling Technologies , LEGO Group).

In order to spread the strategic directions within the organization, the EA team has, on the one hand, developed new EA design principles, an architecture success scorecard, and new architecture panels in the LEGO Group. The EA design principles are following the lighthouse metaphor and describe the ideal future state of the platform architecture that individual design decisions should strive towards (c.f. Haki & Legner, 2013). The success scorecard safeguards their implementation by evaluating individual solution designs in terms of their impact on the overall platform architecture. In addition, the architecture panels provide a forum where individual solutions are challenged against the principles and all architects engage in discussions around architectural quality. As the principles and the scorecard are guiding a multitude of diverse stakeholders from within and outside the architecture community, the specific content has been carefully elaborated in close collaboration with a variety of heterogeneous opinion leaders to provide meaningful guidance to all distinct perspectives and interpretations. In the future, the artefacts will be continuously refined by new insights from strategic directions and should feed the centrally-developed guidance into the architecture community to guide platform evolvement.

For this purpose, the vitalization and empowerment of the architecture community is one of the most crucial challenges for the EA team to foster close collaboration as well as cross-fertilization. An important step in this context has been the establishment of the mandate for all architects to enforce ar-

chitectural quality in individual solution designs over other potentially contradicting interests. This authority is considered a vital step by the EA team to trigger the change in direction from a drifting II towards a digital platform. "What I do hope that we will not see happening in the future anymore is that project leaders […] take architectural decisions because of time-pressures, [or] budget constraints […] I think for these kind of situations we are in a good shape" (EA Director, LEGO Group).

While the development of the strategic directions is still on-going, the introduction of new EA design principles and the success scorecard in the architecture community are already making an impact on design decisions in the LEGO Group. For once, the two artefacts have triggered changes of mindset and discussions around architectural quality in the community. "I have already seen […] that it gives people the ability to take a step back and look at the decisions that we have made and actually question: 'Are they the right ones?'. And I was not really expecting that so much, but […] I am quite encouraged" (Head of Business-Enabling Technologies, LEGO Group). Additionally, discussions around the principles as well as the scorecard have also lead to revisions and modifications of actual solution designs under construction and their implementations are making the first impact on the overall system landscape. Nevertheless, these steps only constitute the small beginning of a long journey of transforming the LEGO Group's II into a digital platform.

5 Analysis

This section provides a detailed analysis of how the LEGO Group is embarking on path constitution to re-architect its drifting infrastructure and introduce transforming processes through collective action that will eliminate path dependencies and pave the way towards a flexible digital platform (c.f. Figure 2).

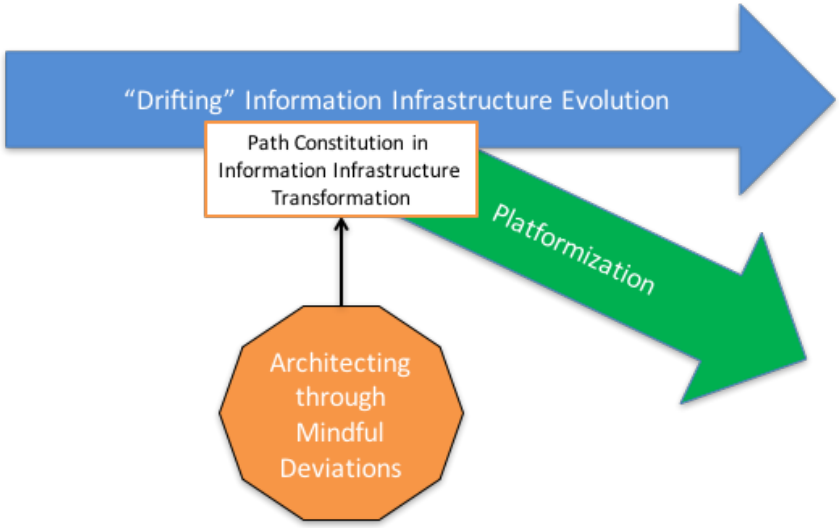

Figure 2. Conceptual Process Model: Creating a new 'Platformization' Path in the Transformation of an Information Infrastructure

5.1 Path-Dependence of Drifting Information Infrastructure

Before the establishment of cross-functional, long-term architectural guidance, the company's II evolved in a path-dependent process of functionally distributed actors bolting individual solutions onto the installed base to satisfy specific business requirements. As this process unfolded, tight coupling as well as architectural debt of the overall IT landscape increased. At the same time, the II's flexibility was incrementally reduced and progressively limited the company's options when implementing new IT solutions. This lead to an installed base that favored novel IT capabilities to be appended in the same architectural style as previous solutions, because the associated development effort was per-

ceived inferior to what would have been required for more sustainable architectural designs. Since this behavior increased architectural debt even further, the process was self-reinforcing in nature.

Consequently, the organization was progressing on a socio-technical path of drifting II evolution (c.f. Hanseth, 1999) that was beyond the influence of human actors and incrementally reducing actionable technology options. In individual lock-in situations, this path lead to the implementation of artificially engineered solutions to stick to familiar systems despite the availability of more efficient alternatives.

5.2 Mindful Deviations and Path Creation

Particularly due to this socio-technical path dependence, the central architecture function has been intentionally designed with strong roots in the architecture community and composed of experienced architects from within the organization with deep knowledge on the II's installed base. Subsequently, the team mindfully deviated from existing structures and artefacts in several ways aiming for the establishment of a long-term sustainable architectural design framework that would create new transforming evolution paths in the system landscape and increase actionable technology options.

For once, against the predefined strategy of simply governing the platform architecture going forward, the team identified the need for fundamentally new strategic directions for integration, cloud adoption, and data. As the development of these strategies is met by resistance from individuals in the company, the architects are faced with the challenge to mobilize minds, span organizational boundaries, and co-evolve stakeholder minds with ideas (c.f. Garud & Karnoe, 2001). For this purpose, the team is involving key stakeholders into the strategy-development processes to create commitment and equally modifying ideas while at the same time challenging mindsets in the organization – well-aware that the outcome "from these processes may be very different from what was initially conceptualized" (Garud & Karnoe 2001, p.19). According to Garud & Karnoe (2001), the management of this tension between commitment and flexibility is a crucial challenge of path creation processes and carefully choosing the right extent of deviation is critical for success.

Another mean of deviation has been the development and maintenance of new architectural design principles. Although this deviation has occurred within the regular responsibilities of the function, the new artefact does constitute a breaking departure from existing practices and meanings that will impact the frames and actions of a large stakeholder audience (c.f. Garud & Karnoe, 2001). As with the strategy-development processes, the principles have been equally shaped through an engagement process of heterogeneous stakeholders that required architects to be persistent to their initial ideas while equally maintaining flexibility for modifications to reach superior outcomes. In this context, the ability to span boundaries and present " an idea in ways that are understandable by others" (Garud & Karnoe 2001, p.14) has been crucial to mobilize stakeholders and provide meaningful guidance to the architecture community.

By introducing the architecture design principles and the success scorecard to the organization, the team strives for the guidance of collective action to constitute a new path of platformization (c.f. Figure 2). This approach resembles the concept of installed base cultivation in II development and Rolland et al.'s (2015) approach for intentional cultivation of existing architectures over time. In contrast to installed base cultivation, which tends to view path dependencies as a near-inexorable force (Hanseth & Lyytinen 2010), however, the LEGO Group's approach is primarily focusing on the constitution of new paths through small incremental steps. The development of individual solution architectures within the system landscape will be guided by the central design framework and thereby make incremental contributions to the constitution of the overarching platformization path.

In this context, the attainment of the mandate to enforce architectural quality over other constraining factors in the design of individual solutions is a key deviation from predominant relevance structures in the LEGO Group to break away from the path of drifting II evolution. As both, the principles and the scorecard, are continuously refined based on results from the strategy-development processes, the routes of more fine-grained individual paths, which constitute the overall platformization path, will be subject to periodic change. Nevertheless, the overall direction will remain constant and gradually transform the system landscape into a purposefully architected digital platform.

Eventually, the generation of momentum around future directions was additionally amplified by the documentation of the current system landscape that emphasizes the need for change – not only to the architecture community, but also to senior management. The landscape documentation therefore elucidates the path-dependent nature of the II's evolvement and simultaneously supports the mobilization of minds for a new path trajectory.

So far, the path-creating impact of these deviations is mostly observable in terms of organizational momentum, mindset changes, and the redesign of several individual solutions. Even though these are just small steps in a large journey ahead, they indicate a clear junction from the II's previous development trajectory. The continuation of this transformation towards a digital platform will require the path's sustainment in the future.

6 Findings and Conclusions

The case evidence and analysis reveal how a company can re-architect its distributedly-managed, drifting II and trigger the incremental transformation towards a centrally-guided digital platform. This perspective contrasts the notion of extensive transformational programs. In the case of the LEGO Group, the need for this transformation emerged from corporate II's limited flexibility and the lack of cross-functional, long-term guidance of its development trajectory. By establishing and vitalizing an integrated, long-term architectural vision, the corporate II is brought under a central design framework and will subsequently be gradually transformed into a more flexible platform that will be better suited to enable the company's progressing digitalization journey. While previous case studies of the LEGO Group have elaborated on this journey in the wider context of the entire company (El Sawy et al. 2016; Andersen & Ross 2016), this research contribution provides a process model that explains the underlying architectural journey.

Particularly, the conceptualization of architecting as a process of path constitution elucidates how an organization can break away from the prevalent development trajectory of an II shaped by socio-technical path dependence. Such a perspective is relevant, as the existing research on II development has tended to see path dependence in II development as a near-inexorable force that cannot be overcome. In contrast, within the path dependence literature, active path creation by path-breaking development has increasingly been demonstrated to be a viable, and necessary, option for the long-term survival of an institution (Alvarez & Barney 2007; Garud et al. 2010).

While Ciborra (2000) emphasizes general lack of formative control in II development as well as evolution, this study acknowledges the infeasibility of top-down management by control but additionally proclaims the active influence by human actors under the recognition of emergent forces. Drawing on the concept of path constitution allows for the elucidation of this balance between constraining path dependencies and intentional path creation that actors need to manage when engaging in deliberate II transformation. The observations also confirm earlier findings by Rolland et al. (2015) who stress the path-dependent nature of architecture practices.

Additionally, this paper discloses in detail how the path dependencies of an existing II are addressed by individual actors mindfully deviating from existing structures to guide collective action and cultivate the installed base of the II through small incremental steps into the intended development trajectory. For this purpose, the case evidence explores which specific deviations the central architecture unit in the LEGO Group is embarking on to trigger the constitution of a new platformization path. By taking an insider's view on this process, the analysis shows that the creation of new paths in a traditional brick-and-mortar company requires not only the conquest of socio-technical path dependence in terms of IS (i.e. technology, tasks, and people), but also the modification of relevance structures and mindsets of stakeholders in the IT organization.

This observation stresses the significance of human agency in II development and underlines the importance of boundary spanning communication as well as the co-evolution of minds and ideas (c.f. Garud & Karnoe, 2001). To introduce path-creating II development, the battles need to be fought at the social level and changes, in terms of ways of thinking, need to be achieved first. Subsequently,

through new strategic directions, principles, and other guiding communication, this allows for technical changes in the II to take place. In the LEGO Group, the hybrid setup of the architecture community as well as the pro-active engagement with key stakeholders ensure buy-in in the organization for architecture initiatives and prevent the architects from moving into an ivory tower. The findings therefore also support Singh et al.'s (2015) proposition that path constitution is equally emergent as well as deliberate in nature and may entail periods of stronger path-dependence, while offering opportunities for deliberate intervention by human actors at any time.

7 Limitations and Future Research

As in any research, this study is subject to limitations and validity threats that should be addressed in future research. For once, although the case evidence indicates a juncture in the current development trajectory of the LEGO Group's II, it remains to be seen if this path can be sustained and if the architects' deviations will truly create a path towards platformization. It is therefore impossible to evaluate how effective the disclosed deviations are up to this day and if the case evidence should be utilized to derive normative conclusions. Nevertheless, the paper takes an insider's view on path creation in the present and future research will address the significance of these interventions for the eventual path evolution. Eventually, this paper only presents evidence from a single case. Before generalizing any conclusions to a wider population of organizations, more evidence is required to evaluate, if other companies are facing equal challenges and are able to solve them through similar strategies.

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