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How to cite this publication

Please cite the final published version:

Tambo T., Clausen N.D. (2018) Business Process Management, Continuous Improvement and Enterprise Architecture: In the Jungle of Governance. In: Müller S., Nielsen J. (eds) Nordic Contributions in IS Research. SCIS 2018. Lecture Notes in Business Information Processing, vol 326. Springer, Cham

Publication metadata

Title:	<i>Business Process Management, Continuous Improvement and Enterprise Architecture: In the Jungle of Governance</i>
Author(s):	<i>Tambo T., Clausen N.D.</i>
Book title	<i>Lecture Notes in Business Information Processing</i>
DOI/Link:	https://doi.org/10.1007/978-3-319-96367-9_4
Document version:	<i>Pre-print</i>

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Business Process Management, Continuous Improvement and Enterprise Architecture: In the Jungle of Governance

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Abstract. Business Process Management (BPM) is fundamental in IT/IS systems requirement specifications and is also well positioned in Enterprise Architecture (EA) frameworks and practices. Continuous Improvement (CI) relates to agendas of lean, six sigma, and incessant push for increased effectiveness of the organization. This paper is developing a position of EA-driven BPM as being long-term, strategic and “slow”, whereas CI is short-term, operational and “fast”. A case study is presented, where CI is furthermore locally based and BPM is centrally based in a larger organization. This leads to conflicts between BPM and CI where the corporate value of both is eroded as IS initiatives on ERP implementation are prolonged and CI initiatives fail to match to-be scenarios. This paper discuss EA as a mediator, where EA is communicating business opportunities to “positive” CI initiatives and aiming at stopping “negative” CI initiatives. An EA-based process tracing mechanism is suggested and demonstrated connecting business processes, ERP, and silo-based elements for CI initiatives. Furthermore, a CI project management tool is discussed to outline screening opportunities for EA-based CI reviews. An agenda is developed to ensure that CI projects are developed according to the Enterprise Architecture and developed along the organizational architecture and not as silo projects. Furthermore Enterprise Architecture is in such case not alone to induce changes and EA must develop methods to synchronise and coordinate with other change processes.

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Keywords: Enterprise Architecture · Business Process Management
Continuous Improvement

1 Introduction

Business Process Management (BPM) is a commonplace regime for structuration of work processes in information systems (IS) [1]. BPM is widely accepted for use in requirements engineering, formalization of work process narratives and human-computer interface descriptions. Enterprise Architecture (EA) describes the relationship

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N. D. Clausen—Business Architect.

between business strategy and technology; BPM is one of several artefacts of EA [2–5]. EA and BPM forms the corporate trajectory from as-is to to-be states; as this is often requiring larger scale systems engineering and change management its time dimension is extensive. Continuous Improvement (CI) is likewise commonly accepted in corporate governance in order to adapt to rapid changes, and create short-term transitional initiatives overcoming here-and-now deficiencies related to operational efficiency, market requirements, manufacturing circumstances or legislative issues [6–8]. This is not overlooking that CI is often and foremost a management philosophy linking to especially lean thinking.

Looking at CI as the fast track of decision-making and implementation of change this paper is analyzing and discussing the relationship between EA, BPM and CI as contradictory and sometimes counter-productive. The lens of the paper is that EA most obvious as a potential mediating factor. We claim that changes affecting any form of architecture – also from other management systems - must be governed within EA to maintain the best possible (digital) representation of the link between business strategy and the operating model. The research question is stated as: Can EA embrace CI to a level where benefits of CI in terms of value and speed is integrated into the BPM, or will CI run disjointly with BPM and blur the EA with reduced value as a consequence?

This paper is based on a case study from the company Delight Inc. Delight operates both an EA and a CI program. The associated with the EA program resides a BPM program that is managed centrally for ensuring alignment between business process and the ERP system. The CI programme is mostly managed decentrally. The CI programme is largely assumed to impact the BPM program negatively, and a more explicit EA implementation effort is review to ensure value creation.

2 Methodology

The methodology for the paper is twofold; a systematic literature review (SLR) from Kitchenham and Charters [9] and a qualitative, interpretive case study from Saunders [10] and Walsham [11]. The case study was performed during 2016–17 through interviews, action research and observations in Delight. The case study provided an understanding of the literature in context to a case in order to acquire practical knowledge within the paper topics [10]. The literature review is based on the SLR framework [9]; Planning, execution and analysis. This method is chosen to have a clearly define methodology for the literature review and SLR is a well-defined methodology as a framework for a literature review [9].

The literature review has been conducted from different sources in the reviewing process to identify relevant literature for the research. A broad range of general scientific search databases has been used, a.o. IEEE, ScienceDirect, SpringerLink and Google Scholar.

Predefined keywords have been identified based on the research questions. The keywords relevant to search in these sources to identify relevant knowledge for the research questions. The keywords have been used to identify relevant articles by searching the keywords in the paper's metadata. EA, CI and BPM easily yields relevant results, however the intersection between the concepts is less easy especially when it

comes to a critical analysis of the interrelations. A number of papers are included where a general critical posture to the concepts of EA and CI is presented. This position is introduced to understand the theoretical motivation for a gap between EA and CI.

The action research took place by posting a BPM/EA specialist (co-author) from the global headquarter in the largest European sales offices for 3 months. The research is a part of an overall longitudinal study in the company initiated in 2014 and remains ongoing. The specialist reviewed recent (local) CI initiatives, and added these to a database of local initiatives. Also was made open presentations of the (central) BPM program as organizational interventions. Mock-ups and basic training were made to elicit further knowledge on motives and drivers, and incite user responses on viability of CI initiatives in the light of the BPM program. With a final aim of defining solutions to improve governance, improve IS project success, and elevate awareness in the organization, the study furthermore has elements of pragmatism [12] and design science [13].

3 Theory and Background

EA is the “analysis and documentation of an enterprise in its current and future states from an integrated strategy, business, and technology perspective” [14]. Its quintessence lies in building an organizing meta-context for an alignment of technology planning, and business planning to its strategic planning as its primary driver [5, 14]. EA defines the policies and standards for design of technologies, databases and application to the business. The role of Enterprise Architect is to strategically organise and design the technology components to aim for strategic alignment [14]. Lankhorst [5] defines EA as instrumental for the integration of business and technology across the organization consisting of four fundamental elements; “organizational structure, business processes, information systems and infrastructure” [5].

EA is about “planning, design, and integration activities related to a company’s business processes, information and technology infrastructure” [15] holistic but related to: System information, applications, technical and business units; EA needs to be considered as a framework that help to control direction and effort [1].

EA is about relationships and elements of the business and the tool to integrate, govern and analyze the organizational elements [13]. Bernus [2] describes these elements as a complex system that EA should be designed for organizational performance. EA is instrumental in analyzing gap between the current state and future state architecture [4]. Shuja [14] describes EA’s role to identify the gap between as-is and to-be architecture and EA to ensure proper linkages. Pontacoloni [15] has defined the roles of an Enterprise Architect as to have understanding and overview of the entire enterprise, both internal and external.

The goals for EA is to be able to identify the above incompatible systems, e.g. Feral Information Systems [27], and integrate them in the organizational architecture. EA should be able to identify changes in the business and identify the challenges that will affect the business [13]. Rouhani [28] focuses on effective communication across the teams with process maps as enablers to communicate, coordinate and cooperate.

von Rosing et al. [29] describes BPM as a management process entailing work practices, life-cycle of actions, and structuration of services. von Rosing finds EA as the technology discipline that sets the framework for the business design. Witts separates BPM and EA stating that BPM is to capture and improve the business processes to achieve efficiency [30].

Bernus [2] do not see the benefits acquired in EA, if the documentation of the business processes does not meet quality standards. BPM provides the methods and tools in order for the organization to manage and optimize the processes [31]. BPM is to achieve process efficiency, process compliance, process standardization, process agility and process visibility [31]. The Process Architecture of EA can apply value and create the holistic overview of the processes [32]. As Schooff [32] describes leads BPM to Business Architecture which lead to Enterprise Architecture. The value created with EA is reflected by how the organization manage the business processes of the EA architecture layer, the business architecture and fit into the architecture [29]. von Rosing [29] add visual modelling of EA to Lankhorsts perspective [5]. Bernus [2] correlates EA standards with ISO9001, which requires that the business processes are modelled and shared across the enterprise.

Aligning BPM and EA can be a helpful tool in order to define the interoperability in services, e.g. applications in the organization [33]. Aligning the business processes with the Application and Technology architecture will create added value in the organization [29]. According to von Rosing et al. [29] can neither BPM nor EA stand alone as the people of EA focuses on IT alignment and the people of BPM focuses on business optimization, efficiency, effectiveness through CI.

With a focus on CI, the EA elements need to be integrated into the projects. In a project, the focus shall not only be on improving the process, but also take into consideration the data, technologies and services [14]. Rouhani [28] supports the project view with 8-step model for running projects: Identification; Conceptualization; Requirements definition; Design; Implementation description; Construction; Operation; Decommission.

EA management plans must be seen as improvement projects from a holistic view [3]. Achieving the alignment between BPM and EA will create transparency across the organization [29]. EA will ensure that BPM have data to perform performance measure and additionally have the agility to change business processes [29]. Finally, both BPM and EA covers the Enterprise Landscape and the combination will provide a better outcome and achieve strategic alignment across the organization [4].

In order to achieve agility, BPM must support CI in the organization [29]. Lankhorst [5] indicates that CI must address the EA and not the BPM. CI programs are based on process lifecycles, where BPM will set the desired changes and EA will align with the future state by changing the enterprise architecture accordingly [29, 33]. It is the responsibility for the Enterprise Architect to be able to achieve sufficient adaptability of all the EA layers [1] and achieve more flexibility that complexity [29].

As governance frameworks, EA and CI are forming a mainstream within their respective fields, however EA and CI are also subject to criticism. EA is stated as a (relatively) young discipline, with van Steenberg et al. [19] proposing a multi-criteria maturity model where companies and architects can be low on maturity leading to

failure as well as high on a sufficient range of criteria leading to successful transformation. EA – read as Enterprise Engineering – is criticized by Dietz et al. [20] for being based on the principles from scientific management and overlooking complexity and human dimensions. Congruent findings are obtained by Hope et al. [21] in pinpointing EA implementation as (risk of) failing to capture practice, routines and improvisations. Seppanen [22] presents a set of critical success factors for EA to balance between the pressure for (digital) enterprise transformations and the organisations capability, readiness and receptiveness to an architectural mindset.

CI is criticized for its short term goal-race insufficiently creating sustained result [23]. McCann et al. [24] has researched lean management and CI and found significant problems in having CI produce lasting impacts; over time impact erodes. The explanatory framework is related to CI claiming impact in areas where other governance regimes set minimum standards, or where employees feel stronger commitment to professional practices than to “management fads” [26].

The dual strands of governance outlined by CI and EA is presented in Fig. 1. The mutual influence is illustrated in the figure as counting aspects ranging from business strategy to influence on the operating model of the company. A critical gap is represented by the uncoordinated change of business processes [26, 27]. The gap is constituted by factors like (1) EA involves technology, CI is not necessarily involving technology, (2) architecture can be a purpose of its own in EA, CI is to deliver immediate business results, (3) EA is founded in long-term orientation, CI is fundamentally short-term oriented. The latter gap factor is especially complex as processes of the operating model are susceptible to contradicting changes. The subsequent part of this paper aims at understanding the impact and the mitigation related to the gap and design requirements for improvement solutions [13].

Fig. 1. Mapping of corporate processes

The subsequent part of this paper aims at understanding the impact and the mitigation related to the gap and design requirements for improvement solutions [13]. The theoretical research lens in the case study below is addressing a paradoxical nature suggested in Fig. 1 of business processes and – partly – information systems under change from differing management systems.

4 Case Study

In this section, a case study is presented. The purpose of the case study is to illustrate an organization, where CI and BPM – as two highly important and costly initiatives – have started to diverge and incite suboptimization. The purpose of the case, as including elements of actionable design, is furthermore to consider solutions to the conundrum of concurrent, competing or contradicting management systems as a presumption for productive IS research.

Delight Inc. is a building component producer in the European market with sales units in across Northern Europe and production in Eastern Europe. Delight is formed out of a number of “predecessor” companies merged in an acquisitive process. Administration, manufacturing and IT are cross-organisational where as sales, service and marketing is still connected to the “predecessor” companies as individual brands.

Delight introduced Business Process Management five years ago to prepare for an ERP system implementation (SAP) to consolidate ERP systems of the “predecessor” companies. Processes are defined as standardized processes based both on work practice, best practice and the process conduct stipulated by SAP. The business processes have been documented in the software iGrafx as the documentation has been focused on the to-be stage of the organization in relation to SAP. Delight sees also the business process model as a tool for training, process improvement and cross-national harmonisation.

In order for the organization to react to the changes in the market and as a general principle of lean process governance, Delight introduced alongside BPM a cross-organisational CI program, see Fig. 2. Business units were inspired to grow a culture of CI in line with the philosophy of Lean Manufacturing. The CI program is rooted locally in the organization by e.g. adding CI targets to low level and middle managers contracts, and local level monetary rewards for rapid improvement initiatives. Cross-organisational CI initiatives are rare and assumed difficult due geographic diversity and history of local corporate cultures related to the brands (or “predecessor” companies).

Fig. 2. Delight’s setup to identify changes to architecture

The CI program is largely disconnected from the BPM. Some business units and managers have development and implementation of CI initiatives as a KPI. The BPM organization and the SAP implementation effort is challenged due to ongoing CI changes eroding agreed processes and de-harmonising work practices. This is partly contributing to a prolonged SAP implementation process, but is also created from “organizational impatience” with the extended duration of the SAP implementation.

Some initiatives have been started in order to align the CI program with the BPM by creating a project registration tool, where the managers and specialists define the target projects and outline implications.

Architecture is used as an overarching activity to align BPM and IS. Projects must draw on the architectural conceptualizations, while apparent behavior is that CI initiatives overstate emphasis on local processes instead of aligning with architectural considerations. Two examples were identified under the case study that shown the lack of architectural alignment in these projects, with two different problems.

Minicase 1: The purpose of this project was to automate the process of producing AutoCad files from engineering to manufacturing. The project was run by the Technical Department in X Country, and the solution should be able to draw AutoCad files based on exported data from the as-is ERP system, BaaN. EA was not taken into consideration before beginning the development raising these issues:

- The software was developed to BaaN and not developed to the new ERP system, SAP, that was to be implemented
- The architecture in Delight do not have the data structure to handle the requests from the software, so the data needed is to be extracted and input manually in the software
- The system is developed without no consideration for how to fit into the architecture of the company, not of bad will, but due to lack of insight and “architectural thinking”

A new product configurator was built into the software even though the configurator is built in BaaN. The organization do then have to spend resources for systems maintenance, operations and IT service costs.

Minicase 2: A strategic goal was communicated to the organization to focus on having a better overview of the projects and project status in the subsidiaries. As a response to this call, four different offices in a large subsidiary started development of project management tools. The tools were seen as being at an office level, and no coordination or demand for central solutions were demanded by the subsidiary management. The first project was developed as a manual entry Excel sheet, the second project was developed in SharePoint as a project tool, the third was developed in Excel where the Excel sheet extracted data from systems, and the fourth project was yet another, but different, manual entry Excel sheet. Four different solutions to the same problem with data structured in four different ways. With no architectural overview following problems occurred in this example:

- Four different non-compliant data structures
- Development costs for four project

- Four different data inputs and outputs
- No usages of the standardised business processes across the organization

All projects were implemented in the respectively departments as the architectural standards and policies are non-existing in the CI program, and therefore were both projects accepted in the local organizations (silos).

The case study reveal a close, but not always productive, relationship between the initiatives. Many CI initiatives require IT changes, and IT changes require BPM changes. Characteristically, the initiatives are enacted as small projects with emphasis on short delivery cycles. Furthermore local decision-makers exhibit unawareness of consequences of local level change to the overall benefit of harmonization of processes, “communication in the same language”, and reflections to the lack of an adequate services architecture communicated. More than 100 smaller projects were found addressing CI, but not addressing implications for the overall BPM model.

5 Analysis and Solutions

The business processes in Delight need to be aligned with the information technologies in order to make enterprise architecture efforts meaningful in the organization [5]. Delight needs stable and/or controlled business processes in order to reach a successful implementation of SAP [29] and ensure a generally credible governance in respect to e.g. financial reporting and quality assurance. Above is described how EA and CI affects business processes within the gap described in Fig. 1. Subsequently, the development of a methodology for bridging this gap is described.

Business processes were coded with a unique identifier in the set verbal business process documentation. Business processes were then defined through a qualitative elicitation and identification process, and were assigned with a code and a semi-formal definition in the representation tool iGraphx, see Fig. 3. The same code was subsequently used in SAP implementation framework. A tool was created to analyse the alignment of managed business processes in iGraphx and work practices by comparing to transaction codes from SAP. The management analysts can now see, what processes that were executed non-compliant according to the stated definitions, e.g. a salesman issuing a purchase order, or a customer invoice send from a warehouse rather than the account receivables.

Having aligned the systems defined by the EA, and business processes thus enabled measuring of the user behaviour in the organization by matching the permissions from the IT systems, the documented permissions in BPM and the actual IT system usages. With a cross-organisational representation of the IT system and Business Processes, the organization can measure on the level of (mis-) alignment between the elements of business processes, systems and people [34], cf Fig. 4.

Visualizing the technologies and applications that support the activities in the business processes [1] will help the organization to achieve an overview over the EA elements; systems, people and processes [15]. Delight needs to visualize what activities are related to what systems. When this is achieved the focus on getting the holistic overview over the information and data can be identified. Getting the data overview

Fig. 3. Diagram of BPM-based process monitoring

BPM	User Authorization	System
1. Department	1. User	1. User
2. Process	2. Job Role	2. Usage of Transaction Code
3. Job Role	3. System	
4. Activity	4. Transaction Code	
5. System		
6. Transaction Code		

Fig. 4. Overview of how alignment is achieved between System, Business Processes and Authorizations

will then allow Delight to use the data for process performance and then identify process improvements [4].

As identified and presented in the case study Delight is challenged with its CI program running as “silo projects” and without controlled to fit into the architecture, and furthermore not optimized across the different departments. Implementing Enterprise Architecture in Delight will benefit the projects, as the role for EA will then be to identify the changes in the business [13] and to handle the IT development to the overall business strategy [1]. EA will enable identification of cross-project and cross-process capabilities and identify coherence between departments for executive future projects [15].

To include CI in the EA – BPM effort, a process was created, where new projects should be reviewed by an introduced project management office (PMO). The PMO created a form in Microsoft Sharepoint to define the project outline, see Fig. 3. The projects should state if they had implications or requirements for IT or BPM. If they

had no implications or requirements for IT or BPM, and budgetary convincing, the project proposal were classified “just do it”. If projects had IT or BPM implications, an architectural review was introduced to assess architectural and process implications. If implications were unimportant, projects were likewise passed on to resource allocation. If projects from CI, or any other governance function, had architectural implications, the proposals would go into the EA function like any other request within corporate IT.

EA is setting the guidelines for, how the projects should be develop [14] and define the policies and standards for, how the projects should be designed [14]. Delight defines a long term development plan of EA goals and principles [29] and communicate, how to run an IT project to align with the architecture.

The corporate wide business process coding creates a potential for stopping the gap between EA and CI as a common ontology is established. The organization has an overview of all the transactions a department does, and what permissions each job role needs in the IT system. By aligning BPM and IS an exact overview of the business job roles is defined, and what activities roles have permissions to perform, and what they actually do perform [34]. In addition Integrating IS and BPM will increase Delight’s ability to integrate and align IT, processes and people in the EA [34].

Delight has only documented the business processes for the future state. Absence of current state processes is unfortunate in lengthy implementation projects. Customers can’t clearly identify scope and focal transformation requirements. The next step for Delight is start defining the ever-present current state of the EA by defining the individual EA layers; business processes, information, data, applications and technologies [15]. This will allow Delight to get a holistic overview of the current architecture in the organization [1].

6 Discussion

BPM and CI are both highly ranked on the agendas of transformation in companies [6–8]. In this discussion these concepts are highlighted against EA to add to our understanding of EA as mean for balancing short-term and long-term transformation. In a tradition of information systems studies the concepts of BPM and CI must be brought to work in synergy in order to overcome barriers for transformation and implementation. The presented conflicting positions between BPM and CI must be switched into mutual support and avoid a zero-sum game process. In the BPM-CI intersection we see EA as an explanatory frame of reference. EA embody strategy and the translation of business strategy into the operating model and technology.

In Fig. 1, the interrelation between EA, CI and BPM is stated, but realizing that in scenarios like Delight, contradictions to “single line” of corporate governance is giving problems. The business processes are dynamic and the dynamics originate from different parallel governance regimes. BPM can’t be established as only being “owned” by the EA practice. CI practice is just as well affected business processes. The thin lines out of CI in Fig. 1 indicate rapid changes on local levels, whereas the bold lines from EA indicate a less agile and a more resource consuming transformation agenda. EA coordinates technology in relation to strategy. CI do not necessarily have any responsibility to the technological dimension of the organization. Traditionally,

business processes are embodied in the EA stack. The study pinpoint other stakeholders than EA. Ironically this calls for a framework for governance of frameworks for corporate governance.

Figure 1 underscore that the operating model of the company will need to navigate in both stable and unstable business processes. The risk of counterproductivity increase as changes are anchored in uncoordinated organizational entities pursuing governance opportunistically e.g. fueled by individual contracts and performance measures. Synchronisation between change becomes critical.

A key theoretical contribution of this paper is the necessity to understand organization dynamics at a process level from the influencing governance regimes. A theoretical contribution is furthermore that there will probably be a significant level of unstable processes imposing challenges to precision in any BPM-founded IS requirements specification. Having centralized process monitoring technologies is significantly helping EA processes following the fundamentals of Ross [14] but observing dynamics in unified as well as diversified operating models. The described implementation of identification, monitoring and screening models suggests that more stable and controllable environments can be realized over time.

The architectural knowledge needs to be achieved through a holistic overview of the current state of the technologies, databases, applications and processes across the organization [14, 15] potentially contradicting local innovativeness. Architectural policies and standards for how to design technologies, databases and application need to be defined [14] and to create a team to develop and maintain IT to deliver solutions to the organization in order to support the changing business objectives [1].

Learning outcomes of the case is that without an organizational architectural awareness and without architectural control, the CI program will run as individual projects at a decentralised level, where the departmental processes are optimized and not the process across departments. This is in line with the theory of Feral Information Systems [27] that are developed to satisfy user needs without alignment with other systems or overall process flow in the organization.

The case and discussion highlight the issue of concurrent or competent corporate governance frameworks in this case CI and EA. It contradicts EA as a top level strategic framework, but is more leading to an understanding of EA one out more, and an importance in EA to include non-EA initiatives into the management plan or transformation agenda. Likewise stable business processes are a problematic perception of working practices. In this sense, CI contradicts BPM by constantly seek change whereas EA-driven BPM seeks stability. Gartners outline of the bimodal (or two-speed) IT organization might solve the matter [35] but doesn't address the risk of losing BPM's bid for harmonized processes. Solutions lie in coordination, synchronization, training, mutual awareness of central and decentral change processes, and a more and more embracing EA.

7 Conclusions

This paper has focused on EA, BPM and CI and the complex and partly contradictory relationship between these elements. A qualitative case study has identified several elements in this area for achieving alignment of the EA with business processes, and how EA can question the challenges in organizations with CI programs.

This paper has demonstrated that running CI programs without an overall control of the Enterprise Architecture will end up with extra costs, silo projects and non-integrated solutions. A gap between EA and CI has been derived from the literature review. The gap is affected process stability in the operating model. Conflicting governance regimes are detrimental to corporate performance at the level of business process and operating model. The paper is describing how the case company developed tools for company wide business process coding and identification connected to the systems of SAP and iGraphx together with supporting systems (“dashboard”) for following up on non-compliance. Additionally a project governance model were introduced with any project proposal being screened for architectural implications.

Organizations need to support the CI projects with technical knowledge and implement EA policies and standards in order to control projects not become silo projects. Integrating a process focus in the improvement projects can identify, what processes that will change in the future stage and create an overview of what systems need changing. By adding this the CI program will then add value to the Enterprise Architectural overview.

As suggestions for further work it will be interesting to investigate, what the effect of implementing information and data into the business model will reflect in the holistic overview for the architecture. If the organizations know what data is generated where and how the data flow is through the business processes will allow the organization to achieve higher data quality and ensure cross sharing of information. It will also be interesting to identify if information and data implementation can add controllability to the CI program and be part of identifying processes to improve by running simulations based on the data.

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