A Historical Study of an Implementation Methodology: A Morphogenetic Analysis

Completed Research Paper

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Abstract

To improve the results of Enterprise Systems (ES) implementation projects, new or revised implementation methodologies are introduced by ES vendors. Yet, the innovation and adoption of implementation methodologies (IM), which are computer-based and incorporate both project management and functional components, can be problematic. The purpose of this paper is to describe and explain the adoption of an implementation methodology. We recount for the adoption of an implementation methodology through the lens of a realist theory of social change. Our qualitative study provides insight into IM instantiation as manifestation of IM adoption configuration generated by the interplay between structure and agency over time, and suggests four implementation methodology adoption configurations: fragmented, aggregated, integrated, and infrastructural. This study also offers a foundation for future work that may contribute to a more coherent view on the instantiation of IMs and adoption configurations.

Keywords: Adoption configuration, Implementation methodology, Morphogenetic approach

Introduction

Enterprise Systems (ES) refers to organisational systems, which include people, processes and information technology (IT). The latter includes packaged Enterprise Systems Software (ESS) like Enterprise Resource Planning (ERP), Customer Relationship Management (CRM), and Supply Chain Management (SCM) (Seddon, Shanks and Willcocks 2003). ESSs are generic applications with a modular design, integrated architecture, embedded 'best practice' and configuration/customisation possibility. Although the two terms ES and ERP have been mostly used synonymously in the literature, in this study they are, as suggested by Seddon et al. (2003), differentiated. ERP represents a type of ESS, while ES refers to organizational systems that are used for integration of data, processes and information technology across internal and external value chains in real time (Seddon et al. 2003).

ES development consists of two life cycles. The first cycle is the development of generic ESS, e.g., ERP software by vendors, and the second, which is the focus of this study, is the ES implementation that takes place in a user organisation. Mainstream ES literature focuses on the implementation of ES in organisations. Following a life-cycle model, ES implementation has been described as a sequence of a number of stages or phases with related activities. Since ES software is rented or purchased, in the case of ES implementation projects the focus has been shifted from developing software to selecting and implementing it. That includes: a) a mix of business process design and change; b) software configuration and/or customisation to align the software with the business processes; and c) project management and evaluation (Davenport 2000; Seddon et al. 2003; Motiwalla and Thompson 2009).

In the literature on the development and deployment of IM, it is interesting to notice that in the SAP community by 1999, only two years after the introduction of AcceleratedSAP (ASAP) in US, customers or implementing organisations from US preferred SAP's methodology rather than methodologies offered by their implementation partners (Input 1999 in Esteves, Chan, Pastor and Rosemann 2003).

Most ES vendors have developed their own instance of IM. For example, Microsoft recommends the "Sure Step" methodology for implementing Microsoft Dynamics solutions and SAP recommends the "AcceleratedSAP" (ASAP) methodology, for implementing SAP solutions. The "AcceleratedSAP" was developed and recommended by SAP AG representing the de-facto standard for implementing SAP solutions. According to Esteves and Pastor (2001), adequate IMs represent a critical success factor in ES implementations, but there is a lack of studies about the features of such methodologies and their adaptation. Adam and Sammon (2004) emphasise as well that more studies are needed to improve our understanding of IM in order to avoid future problems in ES implementations. Esteves and Pastor's (2001) and Esteves and Bohorquez's (2007) annotated bibliographies of ES publications in the main Information Systems journals and conferences for 1997-2000 and 2001-2005 respectively, show that studies regarding ES implementation methodology are scarce.

Although the potential value of ASAP in particular (Bhattacherjee 2000; Hedman 2004), and IM in general is disputed (Truex and Avison 2003), the use of IM is still an intriguing case which deserves further examination for at least three reasons. Firstly, unlike Information Systems Development Methodology (ISDM), the term used in this study to refer to types of ISD methodologies which focus on the development of isolated and function-based software, IM emphasises organisational aspects. This represents a significant distinction between ISDM and IM, the latter representing an alternative approach for providing integrated and process-based ES built on generic software, which can be either rented or purchased and can have the potential to change or maintain the operations of an organization.

Secondly, ES implementation represents a steadily growing market (Jacobson et al. 2007; CBR 2011) with significant budget allocations (Panorama Consulting Group, 2010). Yet, time and budgets overruns have been more a rule than an exception, and the value of ES has been questioned (Grabski, Leech and Lu 2003; Panorama Consulting Group 2010) in ES implementation practice, making the need to study this practice even more relevant. One of the critical success factors for minimizing these issues is represented by IM (Esteves and Pastor 2001; Sumner 2005). Although IM is recommended for implementation of ES (Truex and Avison 2003), there is a scarcity of research (Adam and Sammon 2004) and contradictory findings about the potentialities of IM (van Slooten and Yap 1999; Hedman, 2004) and of its use in ES implementation (Bhattacherjee 2000; Fleisch et al. 2004).

Thirdly, regarding IM as a type of complex innovation technology, it imposes a substantial knowledge burden on adopters that might reduce their performance or impede its use (Fichman and Kemerer 1997). Yet, the use of IM occurs in practice but varies, since, as indicated by a knowledge transfer and learning perspective, the type of knowledge incorporated in IM i.e., how to knowledge, requires reflective users (Mathiassen 1998) and adaptation (Backlund, Hallenborg and Hallgrimsson 2003; Fitzgerald et al. 2002). This proposition is seconded by a structuration perspective which suggests that stakeholders judge the outcomes of their activities and adapt the content and the use of methodologies with regard to their agenda and competences (Sambamurthy and Kirsch 2000; Fitzgerald et al. 2002). Since, the adaptation of IM undertaken by implementers who exhibit reflexivity is unexplored, the research remains silent about potential IM instantiations as manifestation of IM adoption configuration.

Despite their different focus, i.e., ISDM in development of IS, and IM in implementation of ES, both share the same objective in improving the process and the product delivered to customers. Hence, the available ISD research provides an appropriate starting point to explore the potential characteristics of this type of objects. Two dominant ISD literature streams might contribute to study IMs. Based on different assumptions and theoretical schools, the two literature streams which dominate the ISD research are a method engineering stream, and a socio-organizational stream (Baskerville and Stage 2001). Method engineering focuses on ISDM per se and its development and configuration (Ågerfalk and Fitzgerald 2006). A socio-organizational stream of research recognise the social dimensions in IS development and focus on the context and the use of ISDMs and its adaptation by developers in emerging work settings (Baskerville and Stage 2001; Ågerfalk and Fitzgerald 2006). Baskerville and Stage (2001) note, that the two streams of ISD research are dominated by different perspectives: a positivist perspective dominating on method engineering stream; and an interpretive perspective dominating on socio-organizational stream. Positivist and interpretive paradigms seems to lead to theory-practice inconsistencies (Smith 2006) and a problematic notion of causality, which is based on a Humean assumption of regular cause-effect relationships, on positivist paradigm, and interpretations of meanings and idiographic phenomena, on interpretive paradigm (Sayer 2000).

To overcome the inability of the two dominant perspectives in ISD research, i.e., positivist and interpretive, to assist in describing and explaining the dynamics of developing and deploying IM, two different views are available from a radical change perspective. On one hand, a structuralist view, which represents, the relationship between agency and structure as a mutually-constitutive duality, e.g., Orlikowski's (1992) work through a Structuration theory lens. Yet, this view is considered problematic for precluding the interplay between structure and agency (Archer 1995), or for giving precedency human agency while technology is vanishing *"appearing only as an occasion for structuring, without any activity or specificity of its own"* (Berg 1998 p. 466), or for ascribing *"a material existence to structure which Giddens explicitly denies"* (Orlikowski 2000 p. 406). On the other hand, there is an emergent view, which emphasise the dynamic aspect of ISD (Truex et al. 1999), and especially emergence and change in technologies and use (Orlikowski 2000). The foundation for understanding the interaction between structure and agency might be achieved by applying a practice lens and combining different theoretical approaches (Orlikowski 2000; Baskerville and Stage 2001). While these studies, which take a subjective ontological position, are valuable for indicating material arrangements and local settings of interaction, the influence of social structure on interactions and outcomes is neglected. Alternatively, an objectivist ontological position, as endorsed for instance by critical realism, might be applied.

Situated within a critical realism perspective, Archer's (1995; 1996; 2000; 2003; 2007; 2011; 2105) Realist Social Theory, and its complement the morphogenetic approach, conceptualize the interplay between structure and agency over time and space in terms of analytical dualism. The morphogenetic approach (MA), have been recommended for CR-based development of IS theories (Carlsson 2012) and applied in several studies (Volkoff, Strong and Elmes 2007; Horrocks 2009; Mutch 2010). Although considered valuable to provide causal explanations of complex, dynamic and multi-level phenomenon on open systems (Morton 2006; Dobson 2013), it has not yet been applied to IM adoption.

The reason for applying Archer's MA and its component, the theory of reflexivity, is twofold. Firstly, there are divergent suggestions in literature with regard to the combination of sociology of translation, underpinned by Actor-Network theory, which does not differentiate between human and non-human actors, and MA, underpinned by critical realism. Since there might be some potentials, but a warning for caution is suggested (Mutch 2002; Elder-Vass 2008), it seems appropriate at this point to avoid potential

inconsistencies and to investigate the issue of combining the two in another work. Secondly, Archer's (2007) MA with its theory of reflexivity is considered to provide support for both micro- and macro-levels of analysis, and to offer a productive way of approaching the use of IM in ES implementation.

In spite of significant investments in ES implementation, productivity and quality of ES implementations continue to be problematic, and the potential value of using IM in ES implementation is questioned. One potential initiative which is advocated to remediate this type of issues is the adoption of IM. Yet, investigations of IM's adoption are scarce in ES literature. At best, two dominant literature streams might contribute with descriptions of IMs and their development, dominated by a positivist standpoint, and its deployment, dominated by an interpretive standpoint. From a positivist standpoint IM would represent an object that exists in different forms, more or less extensive, and can be used in different types of projects. The focus is on the formal aspect of IMs, i.e., content and functionality. From an interpretive standpoint the focus would be on the context of the adoption of IMs and, hence, their situational aspect, i.e., people, processes and products, which are implemented.

The two standpoints complement each other but represents a regulatory perspective, which focus on describing and explaining stability and, hence, are based on the assumptions that IMs can be integrated and used in different contexts of users who value and are willing to adopt IMs to support their work. What this regulatory perspective ignores are unintended consequences and power relations, which are emphasized by critical and structural standpoints representing a radical change perspective. The latter is considered important in explaining changes in the development and adoption of IMs in different ES implementation contexts. Instead of focusing on either IMs or their context of adoption, the idea is to uncover potential challenges and contradictions that can describe and explain potential changes in their adoption. In other words IMs are assumed to influence and are influenced by the ES implementation context in an intertwined process through development and adoption. Belonging to a regulatory perspective the two dominant streams of research fail to provide causal explanations for changes that occur in the use of IM over time in ES implementation. The inability of the dominant perspectives to assist in explaining changes in the adoption of IM in ES implementation, indicates a need to apply alternative research perspectives. This study represents such an attempt, aiming to provide alternative insights into the adoption of IMs based on an emergent view which is underpinned by critical realism.

In this study we take into consideration the features of a computer-based implementation methodology which, informed by Iivari and Huisman (2007), is regarded as a collection of interrelated components, such as: methods, techniques, toolsets and services underpinned by a buy-in package approach intended to provide production, control, cognitive, cooperation, and infrastructural support. The objective of this paper is to describe and explain the potential adoption of an implementation methodology through the lens of a realist theory of social change. A realist conceptualisation facilitates the description and explanation of IM adoption configurations as a process of change generated by an interplay between structural conditioning and agential interaction over time. More specifically we address the following research questions:

RQ1: What implementation methodology adoption configurations are actualized in the context of an ES implementer organization?

RQ2: How are implementation methodology adoption configurations generated over time?

The research questions are addressed through a historical study of one IM, which is included on the service portfolio of an ES vendor who takes an active role in the implementation of their products. Evolving from vaguely formulated ideas outlined by a buy-in package approach in the early 1980s to a comprehensive platform in the early 2000s, the IM recommended as a de facto standard is made available free of charge for all implementation projects by the vendor. In addition, a strengthened connectivity between product and services and involvement of the vendor in implementation projects take place during this time.

The type of knowledge developed in this study has an explanatory disposition and the efforts are directed toward opening the 'black box' of changes in adopting IMs in ES implementations. The description and potential explanation is based on ISD research and ES research and is enhanced by empirical findings. In this way an extended and systematic way to organise IM consideration and its adoption is provided. As such, this research contributes a theoretically and empirically grounded description and explanation of changes in the adoption of IM. Besides the theoretical contribution, the results from this research can

help ES professionals, i.e. practitioners as well as academics, to become aware of the characteristics of IM's and adoption configurations.

The paper continues with a brief description of Archer's Realist Social Theory, which is applied as a way to conceptualize IS/IT adoption and provides a realist framework which is used to describe and explain the adoption of AcceleratedSAP, as an example of an IM, in an ES-implementation context. Then, the research approach and findings are presented, followed by a discussion of the implications of the findings, concluding with some promising avenues for future research.

Theoretical Foundation

Given the focus on describing and explaining how implementation methodology (IM) adoption configurations evolve over time, Archer's (1995, 2011) Realist Social Theory (RST) is used. RST is underpinned by the Critical Realist (CR) perspective. The central tenets of CR, as developed by the late Bhaskar (1989) and expanded upon by several authors (Archer et al. 1998), are: *stratification*, *differentiation*, *causal explanation*, and *emergence*.

The notion of *stratification* draws attention to the ontology of CR, which regards reality as being stratified into three separable, but interrelated domains: t*he real*, *the actual* and *the empirical*. *Differentiation* emphasises an analytical and temporal distinction between structure and agency since the former is dependent on the activity of the latter, i.e., structure pre-dates agency. Structure and agency are not only distinctive, but also interrelated and emergent, i.e., exist in and through time and through their interplay. In other words, *emergence* is embedded in interaction when structure and agency are shaping and re-shaping one another (Archer 2010). Populating the empirical domain, experiences of social phenomena or events are observable but represent only the starting point of inquiries intended to provide causal explanations. A potential *causal explanation* consists of connecting the three domains of reality as illustrated by Huckle's (2004) example of climate change. Experiences in the *empirical domain*, such as warmer weather or frequent storms, are observable experiences of an increased use of fossil fuels; an event causing the experiences. The event resides in the *actual domain* and occurs or is a manifestation of a failure of global governance to control carbon emission in a global energy economy with unequal power relations located in the *real domain*.

RST is based on the notions of: *analytical dualism*, as a theorizing tool and a foundation for social analysis and explanation of social change, *morphogenesis*, as an explanatory framework for social change, and *reflexivity*, which provides explanatory purchase for agents' distinctive stances toward their social circumstances (Archer 2010; 2015). In this study, analytical dualism informs the interpretation of IM instantiation as manifestation of IM adoption configuration generated by the interplay between structure and agency. The means by which Archer (1995; 2011) suggests the operationalization of analytical dualism are represented by a morphogenetic cycle that consists of three phases: *structural conditioning*; *social interaction*; and, *structural elaboration*.

There is growing interest in the application of CR and particularly Archer's (1995, 2011) morphogenetic approach within IS research. IS scholars, e.g., Carlsson (2011), Dobson et al. (2013), Henfridsson and Bygstad (2013), and Mingers et al. (2013), illustrate its benefits to exploring the IS domain. However, to date there are few empirical studies where Archer's morphogenetic has been applied in organizational adoption studies (Njihia and Merali 2013).

A realist conceptual framework

The realist conceptualization indicates the constituent parts and the causal relationship involved in the instantiation of an implementation methodology, as an event produced by the interplay between structure and agency as depicted in Figure 1.

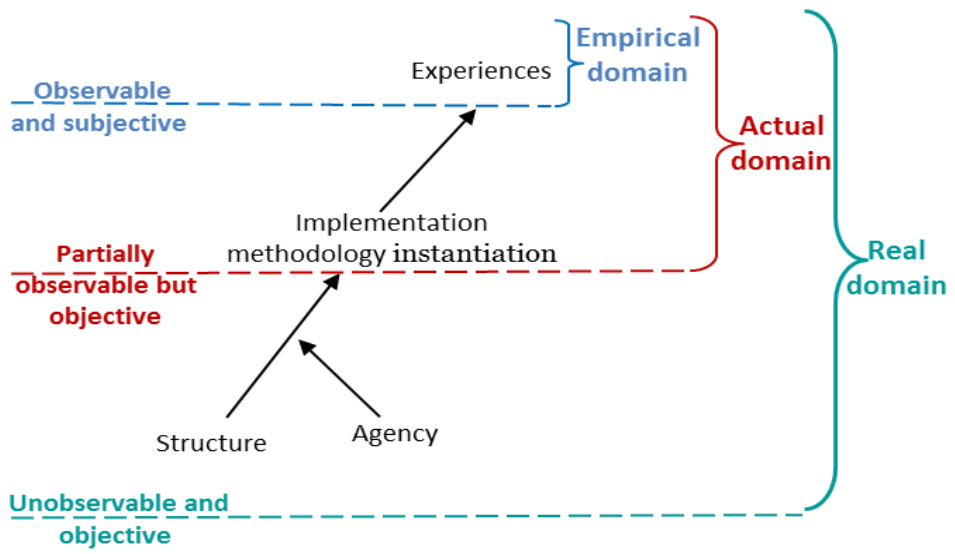

Figure 1. Causal explanation of implementation methodology instantiation

The morphogenetic approach provides both an explanatory framework for examining the interplay between structure and agency as illustrated in Figure 2, and a theoretical lens for developing a theoretical model of the morphogenetic change of IM adoption configuration as a process of change over time.

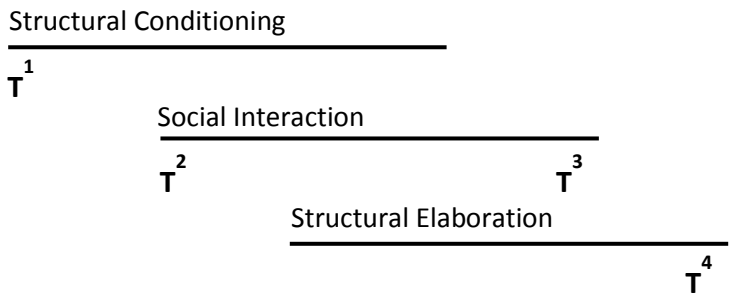

Figure 2. The basic morphogenetic cycle (Archer, 2011)

In the first phase, at Time 1 (T1), the cycle begins with, and is informed by, the structural properties available from previous interactions having occurred in the social context. According to Archer (2011), these are emergent properties and represent relationships which entail: a) material resources such as wealth, power or expertise with regard to structure, and b) ideational sources such as doctrines, theories or beliefs, with reference to culture. Relationships of compatibility or incompatibility, and necessary or contingent between IM and socio-cultural structure create different situational logics.

According to Archer (1995), the four situational logics that provide directional guidance and motivate agents to maintain or alter the status quo due to different systemic relationships are:

1. *Correction,* generated by relationships of *necessary incompatibilities*;
2. *Protection,* generated by relationships of *necessary complementarities*;
3. *Elimination,* generated by relationship of *contingent incompatibilities*; and
4. *Opportunism,* generated by relationships of *contingent compatibilities*.

Each situational logic provides directional guidance for different forms of strategic actions and shapes the situations that differently positioned ES implementers confront when they interact at the second phase of the morphogenetic cycle.

In the second phase, T2-T3, the focus is on agency and concerns the interaction and emergent properties of people possessing reflexive power. They act by virtue of their subjectively defined concerns with regard to three orders of reality: a) well-being concerns with regard to natural order, b) performative achievements with regard to practical order, and c) self-worth with regard to social order. According to Archer (2007), the interplay between people's configurations of concerns, i.e., what they most care about and their context generates four distinctive modes of reflexivity and related stances:

1. An *evasive* stance in the case of *communicative reflexivity* due to ultimate concerns in inter-personal relationships;
2. A *strategic* stance in the case of *autonomous reflexivity* due to ultimate concerns in performative achievements;
3. A *subversive* stance in the case of *meta-reflexivity* due to ultimate concerns in value rationality; and
4. A *passive* stance in the case of *fractured reflexivity* due to a lack of ultimate concerns and hence disconcerted.

Owing to their bargaining power and negotiating strength, which are delineated by material and ideational distributions of resources and their relations with other agents, their interaction, which takes place between T2 and T3, ensues in structural elaboration/reproduction at T4.

In the third phase, T4, interaction ensues in the form of structural elaboration, i.e., reproduction (morphostatis) or transformation (morphogenesis). As a result of exchange and power transactions, agents undergo: a) re-grouping, as of initial ideational sources, i.e., propositions, theories, doctrines, and b) re-constitution of material resources, i.e., wealth, power and expertise are re-distributed during morphogenesis. The results represent the start and structural conditioning of the next morphogenetic cycle, at T1.

Based on this view, we conceptualise IM adoption configurations as a process of change generated by and interplay an interplay between structural conditioning and agential interaction over time where:

1. *Situational logics*, delineated by socio-cultural configurations of resource distributions provide directional guidance to different content adaptation activities; and
2. *Agents' stances*, delineated by self-determined ultimate concerns, outlined by different modes of reflexivity motivating agents to pursue different actions and interactions through power or exchange transactions.

The interplay between 1 and 2, i.e., the interplay between structure and agency, explains the emergence of IM adoption configuration as a morphogenetic process. The results represent the start and structural conditioning of the next morphogenetic cycle, at T1.

The realist conceptualization, depicted in Figure 3, indicates the constituent parts and causal relationship involved in the occurrence of IM instantiations as manifestation of IM adoption configurations, which represents a process of change generated by the interplay between situational logics and the stances of interacting agents. The situational logics condition the agency, which mediates the elaboration, i.e., morphostatic (reproduction), or morphogenetic (transformation) of structural conditions.

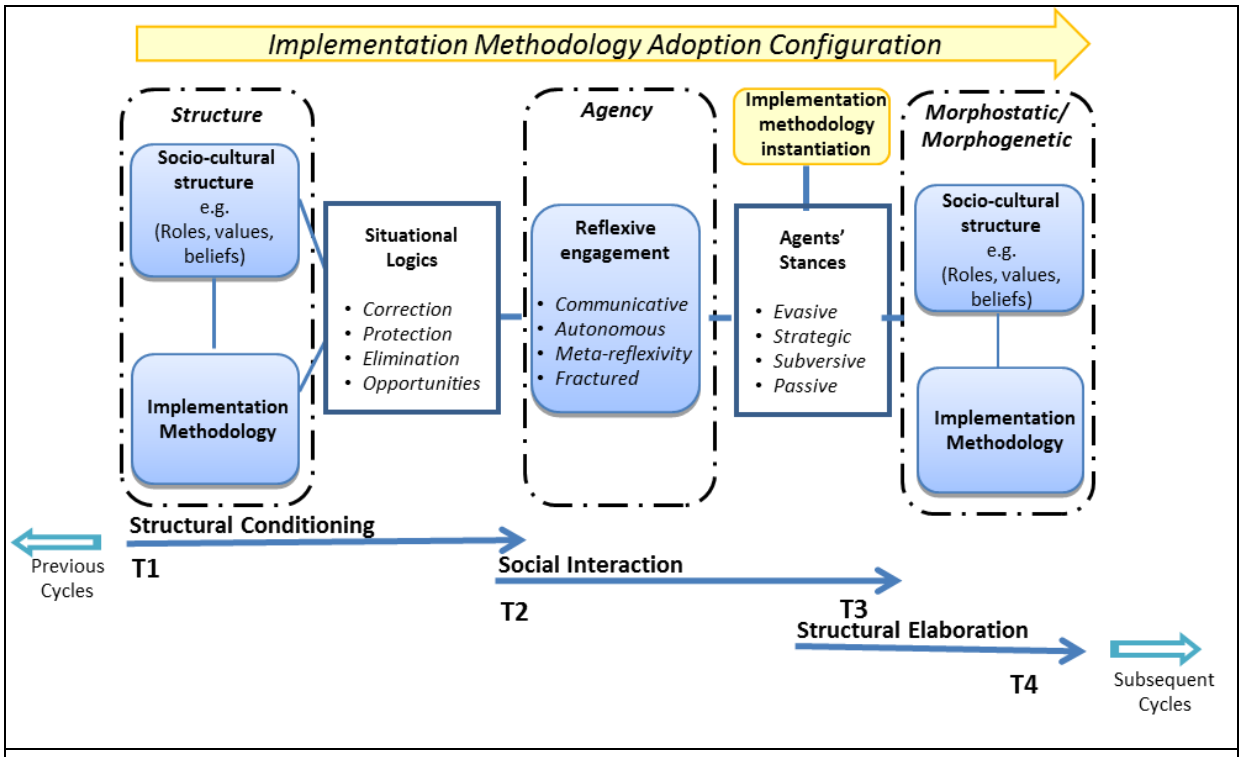

Figure 3. A realist conceptualization of IM adoption configuration

Our conceptualization makes possible to describe and explain implementation methodology adoption configurations as a process of change generated by an interplay between structural conditioning and agential interaction over time.

Research approach

The research approach involves an iterative research process and is based on a longitudinal case study strategy and a qualitative approach to data collection and analysis. The particular case selected for examination is represented by SAP's AcceleratedSAP (ASAP) methodology as one implementation methodology instance that is well documented in research publications (e.g. Esteves et al. 2003). ASAP is recommended by SAP and used by consultants in implementations all over the world. The case also facilitates familiarization with implementation methodology practice (Danermark et al. 2002). Motivated by a need to understand the features and adoption configuration of an implementation methodology, this study is based on a historical research. We focus on historical facts and rely on documents as one of the main sources. Historical research in IS are very valuable as it focuses on *"uniqueness of human experiences within their cultural settings"*, and can shed light on specific aspects in the shaping of events (Mason et al. 1997). According to Mutch (2014, p. 223): *"Many features of critical realism in practice suggest that we might pay more attention to the historical dimensions of analyses"*. Our historical study aims to establish a link between theory, RST's morphogenetic approach, and empirical account (ASAP case).

The study adopts a qualitative multi-method approach, which subsumes a combination of different qualitative data collection techniques. Data on Information Systems Development Methodologies (ISDM) and its use is collected through qualitative literature review, while data on ASAP and its use is gathered trough literature review, interviews and documents. The literature review employed in the first stage of the research is in line with the initial exploratory orientation of the study and Webster and Watson's (2002) recommendation.

Despite divergent opinions regarding terminology and related semantic aspects, ISDM has been interpreted as an organised collection of interrelated components as approach, method, technique, toolset and services intended to support the work of stakeholders involved in the building of an IS (Huisman and Ivari 2006; Avison and Fitzgerald 2006). Informed by this interpretation and due to the focus of this study on the use of IM by implementers the AIS basket-of-IS journals were included in our search. Google Scholar was used to search through web databases for books. Other research databases included in the search were ABI/Inform, SpringerLink, ACM Digital Library, Business Source Premier and Emerald. By combining the terms ES implementation and methodology, and AcceleratedSAP, the search resulted in 145 articles, and from the combination of systems development method and methodology, and CASE tools 547 articles and documents. Based on insights from the literature an integrated view "A realist conceptualization of IM adoption" (Figure 3) was developed. The integrated view is used to guide the collection of qualitative data about ASAP case prospectively at several times and to organize the presentation of the case (presented in the Findings section).

For the ASAP case, two qualitative data-collection techniques are employed in order to gather evidence from interviews and secondary data. Together these complementary data-collection techniques provide a wider scope of coverage and insights into the case. The secondary data consists of documents provided by interviewees as well as additional documents collected from SAP's web place, SAP Conferences and published articles and books with focus on SAP's implementation and ASAP. While customers of SAP vendor and its partners could accept and experience the use of ASAP or Powered by SAP methodologies, it was the implementers who provided and possessed not only experiences but also knowledge about these methodologies and used them in ES implementation projects. Therefore, the primary data, gathered through semi-structured interviews, consists of 21 interviews with implementers from SAP vendor and its implementation partners (Table 2).

Table 1. Summary of Interviewees

No	*Organization*	*Position*	*Date*	*Time*
1	SAP Sweden	Senior consultant	Oct 2004	2 hrs
2	Bore Dahlberg Consulting Sweden	Senior consultant	Oct 2004	2 hrs
3	Spring Consulting Sweden	Senior consultant	Oct 2004	1 hr
4	Spring Consulting Sweden	Management consultant	Oct 2004	1 hr
5	SAP Sweden	Senior business consultant	Nov 2004	2 hr
6	SAP America	SAP Solution Manager consultant	Nov 2004	45 mins
7	Cap Gemini US	Senior consultant	Nov 2004	45 mins
8	Chrysalis Consulting Services US	Senior consultant	Nov 2004	45 mins
9	IBM Business Consulting Services US	Senior consultant	Nov 2004	45 mins
10	Deloitte Consulting US	Consultant	Nov 2004	30 mins
11	Spring Consulting Sweden	Senior consultant	Sep 2008	2 hrs
12	IBM Consulting US	Senior consultant	Sep 2008	1 hr
13	SAP Sweden	Senior business consultant	Sep 2008	1 hr
14	SAP Denmark	Senior consultant	Nov 2010	1 hr
15	SAP	SAP Solution Manager consultant	Jan 2011	45 mins
16	CIBER Sweden	Senior consultant	Mar 2011	1 hr
17	SAP Sweden	Senior support adviser	June 2011	1 hr
18	IBM Consulting Sweden	Senior consultant	June 2011	1 hr
19	SAP Sweden	Senior consultant	June 2011	1 hr
20	Cap Gemini Sweden	Senior consultant	June 2011	45 mins
21	Accenture Sweden	Senior consultant	June 2011	45 mins

The data from the interviews was gathered at three times and serves different purposes. The first ten interviews in 2004 provide information about complementary aspects and interrelated components of ASAP and its use in ES implementation context. All participants from the first round of interviews are contacted for follow-up interviews. Only three of them participated in the second round of interviews in 2008, helping in focusing the orientation of the study and seconding the insights about the significance of adaptation and interaction from the first stage of the research. The last eight interviews provide additional insights into relationships among interrelated components of ASAP adopted by ES implementers. Primary data is used during the empirical grounding of the integrated view of the adoption of IM.

The analysis of the data is realised in two stages and involves data analysis procedures, which reflect the focus of the two stages of the research, i.e., exploratory and descriptive in the first stage, and explanatory and causal in the second. According to Danemark et al. (2002 p. 52) a social science explanation *"requires that we move on from structural analysis to causal analysis"*. Structural analysis is appropriate to build conceptual abstractions and provide a structural description of a phenomenon by referring to its components and their relations (Danemark et al. 2002). However, the structural analysis is yet only a first step which is followed by causal analysis in order to explain *"why what happens actually does happens" or "how the event came about"* (Danemark et al. 2002 p. 52). Causal analysis facilitates the development of causal explanations by referring to causal configurations and mechanisms which interact over time in order to produce an event or phenomenon of interest (Danermark et al. 2002). The limited body of literature on IM and the sizable and heterogeneous body of the literature on ISDMs form the basis for qualitative content analysis in the first stage of the research.

In the second stage of the research, the focus of the analysis shifts from structural analysis towards causal analysis. Informed by Archer's (1995; 1996; 2003; 2007; 2010; 2011) Realist Social Theory (RST), a realist explanation of IM was developed (Figure 3). This potential explanation informs the morphogenetic analysis of ASAP over time. The examination starts with a retrospective analysis of adoption and its two constitutive dimensions of adaptation and interaction. The adaptation is examined with regard to content and purpose of ASAP, as described by the formalized aspects included in the integrated view. The interaction is assessed based on relationships of power or exchange between implementers and other agents. In the interview and document analyses, evidence for content and purpose is determined by the presence or lack of presence of approach, process, activities, tools, services, training, certifications for production, coordination or organisational support. Key words like information, collaboration, sharing, coordination, feedback, cooperation, account for relationships. The result of this first step of the analysis facilitates the periodization of the case in four sequential cycles from early 1980s to 2004 and is presented in the "Findings" section.

Next step in the analysis assess the IM instantiations, and, hence the focus shifts towards situational logics and implementers' stance. The situational logics are examined by the shape of distribution of material resources, like wealth, power or expertise, and ideational resources, like doctrines, theories or beliefs, as structural-cultural configurations. These configurations, which pre-group implementers in corporate or primary agents, result in structural relationships between roles and activities on the institution of SAP implementation, and ideational relationships between ASAP, implementation process and SAP product. As second-order emergents, representing systemic properties, these relationships create different situational logics of action for the realisation of implementers' concerns. The shape of resource distributions in terms of financials, expertise, ideas or beliefs contributing to compatibilities or incompatibilities and necessary or contingent relationships among structural and cultural components, serve as indicators for particular situational logics. The second dimension, which is represented by implementers' (agents') stances, is considered according to implementers' ultimate concerns, which epitomise dominant modes of reflexivity. Lack of, or predominance of concerns for productivity, quality of products or relationships characterising different modes of reflexivity serve as indicators for particular stances.

The causal analysis, presented in the next section (Findings), reveals four morphogenetic cycles in the adoption of ASAP over time. Each cycle follows a morphogenetic sequence of three phases (Archer, 1995, 2011) and begins with structural and cultural conditions contributing to systemic properties, which create particular situational logics. In the next phase, the interplay between particular situational logic and a stance taken by implementers, as a result of their dominant mode of reflexivity, in order to realise their ultimate concerns generates a particular IM instantiation. The effects of the interplay are the last phase of

the cycle and the beginning of the next. As a result of iterations between different cycles both in the first and second step in the analysis, the identification of multi-dimensional changes and different configurations are identified. We develop a taxonomy with four basic patterns. The four morphogenetic cycles and the taxonomy provide the answers to the two research questions addressed by the study.

Findings

We apply the presented realist conceptualization and describe the four morphogenetic cycles that explain the different adoption configurations, *fragmented*, *aggregated*, *integrated* and *infrastructural*, generated over time. The examination follows the structural conditioning, social interaction (situational logics and agents' stances) and structural elaboration phases of the morphogenetic cycle which are described below.

Fragmented adoption configuration — early 1980s–1988

The first morphogenetic cycle delineates the occurrence of a fragmented adoption configuration taking place between early 1980s and 1988.

Structural Conditioning: Available on the market as early as the 1970s, generic application packages began to attract increased interest among customers in the early 1980s. One of the few suppliers of generic software applications and contributors to the growth of the software industry was SAP AG. By the early 1980s the company develops and provides a configurable and mainframe-based business application with integrated modules, known as R/2. The underlying ideas of providing a configurable product are to reduce potential problems related to the development cycle of the application package and to facilitate a rapid implementation.

SAP is organized with centralized management and decentralized operations around the globe. As one of SAP's subsidiaries, SAP America benefits from operational autonomy and focuses on providing complementary services exclusively to their service partners.

Social Interaction:

- *Situational logics*: By the early 1980s, there had been an explosion of corrective repairs initiated via the reinterpretation of IS development methodologies and system development processes in an attempt to resolve the inconsistencies between them. The majority of developers were engaged in corrective efforts directed toward system development content and system development processes. The few organizations that followed the path of ES, such as modular software providers, provided reorienting general guidelines congruent with the principles and assumptions that underpinned their ES solutions. Shaped by the principle of rapid implementation of and configurable application packages, SAP's implementation methodology takes shape as a complementary part to the implementation process of the R/2 product. The corrective ideational repairs fostered by SAP challenged the dominant IS doctrine on the IS market and in IS education. The *selective adaptation* occurring in the SAP implementation context is achieved through a limited extension of the content of implementation methodology by adding cognitive and production support. Hence, the content consists of reorienting principles of a buy-in approach and configuration of R/2 provided by SAP.
- *Agents' stances*: Although continuously increasing, the number of ES vendors who like SAP remained limited. However, SAP did attract the interest of an increasing number of customers and improve its market position. Due to fractured reflexivity, delineated by undetermined concerns and disconcerted experiences, SAP implementers were passive in their orientation towards SAP implementation context. They attempted to advance the alternative principles of a buy-in approach, but also sought to reuse their expertise in IS development. The difficulties encountered in articulating and prioritizing their concerns in relation to R/2 implementation confined implementers as a dependent and subordinated collectivity in reactive and *power-induced interaction* controlled by the R/2 developers.

Structural Elaboration: The effects of selective adaptation realized through a limited extension of the content of the implementation methodology and a reactive power-induced interaction controlled by R/2 developers, contributed to a *fragmented configuration* of implementation methodology by passive implementers in a situation of corrective protection. Passive implementers serve the interests of the R/2

developers who promote a buy-in package approach, as an alternative to in-house development in a centralized organization of interlocking roles and interchangeable personnel with concentrated distribution of resources, most of them oriented towards the development of the R/2 product. This structure of necessary and complementary roles is accompanied by a culture with necessary but contradictory ideas advanced by the syncretic ideas of a buy-in package approach, which gain legitimacy from customers. The position of SAP, as a generic application package provider, is consolidated in the market.

Aggregated adoption configuration — 1989–1992

The second morphogenetic cycle delineates the occurrence of an aggregated adoption configuration of implementation methodology taking place in the SAP implementation context between 1989 and 1992.

Structural Conditioning: By early 1990s SAP introduces a new generic application package called R/3. The generic application package is based on a client-server architecture, which provides the benefits of portability, inter-operability and scalability. In order to benefit from the business processes embedded in the application package, the customer is required to re-engineer its business processes in accordance with the R/3 product. The relationship between SAP and its partners is beneficial for both. Both SAP and its partners retain their operational autonomy and differentiate themselves by specializing in complementary areas of expertise. In the case of SAP America these are exclusively managed by its independent partners on integration, project management and customer services. Despite this variety of complementary, but contingently related operations and expertise, its implementation is far from being without challenges. Both vendor and its partners encounter operational obstructions and practical problems in implementation projects.

Social Interaction:

- *Situational logics:* Exploding demand for SAP solutions and for implementation resources, which were limited in terms of the expertise available, encouraged an increasing number of consulting companies and SAP to join together. There was mutual recognition of benefits between SAP and its implementation partners, but both actors also retained sectional interests in their own operations and in being able to offer diversified services. Part of their protective efforts entailed the reuse of the available, but limited SAP implementation methodology content and the reproduction of their own expertise by adding project management and BPR services. The *selective adaptation* occurring in the SAP implementation context is realized through a horizontal expansion of the implementation methodology content with added control and analysis support provided by independent partners.
- *Agents' stances:* Differentiated partners were able to mobilise and exchange material resources, particularly human assets and expertise. Due to communicative reflexivity, delineated by an ultimate concern for the maintaining of concordant inter-relationships, SAP and its partners were evasive in their orientation toward the SAP implementation context. They conceived their operations within available but differentiated resources. Their *exchange-induced interaction,* realized through cooperation was based on shared interests and an active but circumventing response intended to avoid potential constraints due to a lack of, or incongruent expertise in different SAP implementation areas. Contentment with their position insulated against external stimuli and sustained the reproduction and efficiency of their own operations and expertise.

Structural Elaboration: The effects of a selective adaptation realized through a horizontal extension of the content of the implementation methodology with potential risks for inconsistencies and an exchange-induced interaction of cooperative partners contributed to an *aggregated configuration* of implementation methodology by evasive partners in a situation of defensive protection. Evasive partners with shared interests in their interrelationship are promoting a systematization of a buy-in package approach, in a sectional organization of independent roles and differentiated distribution or resources, most of them oriented toward project management and configuration of SAP's product. This structure of necessary and complementary roles and relations is accompanied by a culture with necessary and complementary ideas, legitimized by an increasing number of partners and customers. The position of SAP as provider and its partners with sectional interests in implementation is consolidated in the market. However, a selective assimilation of novelty and a reduced variety among implementation partners emerged as unintended side-effects in SAP implementation context.

Integrated adoption configuration – 1993-1995

The third morphogenetic cycle delineates the occurrence of an integrated adoption configuration of implementation methodology taking place in an SAP context between 1993 and 1995.

Structural Conditioning: After the release of the R/3 application, the expertise necessary to implement it was shallow. In addition, partners used their own implementation methodologies, which often were better suited to system development than to the task of implementing R/3. SAP America's lack of commitment in the implementation process and the complexity of the R/3 are issues of discontentment and concern for customers who are not only unprepared for the idea of Business Process Reengineering (BPR), but also increasingly dissatisfied with the partners' performance, support and knowledge about R/3. Hence, SAP America is induced in a frustrating situation. In order to tackle this challenge, a team of consultants with past experience having participated in joint SAP implementations were assigned to develop an implementation methodology.

Social Interaction:

- *Situational logics*: ES implementation partners joined together on their own terms and were operationally autonomous. Guided by their own sectional interests, they pursued the opportunity to differentiate their operations and services. Mobilised by SAP America, a team of implementation partners extended the underlying ideas of a buy-in package approach and the implementation process, and exposed a complementary implementation methodology with congruent content. The *comprehensive adaptation* taking place in the SAP implementation context was achieved through a vertical extension of the implementation methodology content with added cooperation and representation support provided by an implementation team.
- *Agents' stances*: Committed to accumulating and integrating differentiated resources, implementation partners joined together and organized their efforts. Due to meta-reflexivity delineated by organic concerns in exposing best practices, implementation partners were subversive in their orientation toward the state of SAP implementation context and concentrated on providing a specialized set of ideas and resources that were compatible with an SAP implementation role. Their *exchange-induced interaction*, achieved through collaboration, was based on a commitment to integrate resources in an attempt to improve quality and raise value rationality in the SAP implementation.

Structural Elaboration: The effects of a comprehensive adaptation achieved through the vertical extension of the content of the implementation methodology and an exchange-induced interaction of collaborative partners, contributed to an *integrated configuration* of implementation methodology by subversive implementers in a situation of protective opportunism. A subversive team of collaborative partners with shared interests in value rationality and quality was stimulating a systematization of an implementation methodology in a cohesive organization or interrelated roles and similar distribution of resources. This structure of contingent but complementary roles and resources was accompanied by a culture with necessary and complementary ideas sponsored by SAP and legitimized by an increasing number of customers. A display of the alternative values that might animate the interests of passive and diversified partners has emerged as an unintended side-effect.

Infrastructural adoption configuration — 1996– early 2000s

The fourth morphogenetic cycle delineates the occurrence of an infrastructural adoption configuration of the implementation methodology occurring in an SAP implementation context between 1996 and the early 2000s.

Structural Conditioning: By 1996, the outcome of the initiative taken by SAP America and the work of the implementation team was represented by an implementation methodology that had been added to SAP's product development portfolio and extended their complementary services. The implementation methodology was introduced to SAP's partners and customers as ASAP, and was recommended as a *de facto* standard for all SAP implementations. In 1999, ASAP was enhanced via the implementation of related support tools such as the SAP Solution Manager platform, which was integrated into all SAP installations free of charge and was thereafter owned by the customer. The platform came to comprise

part of SAP's NetWeaver platform. Some of SAP's implementation partners initiated the development and deployment of their own methodologies by extending and/or integrating elements of ASAP. Others deployed ASAP and collaborated with the vendor to enhance it. Positive results in terms of efficiency and effectiveness were indicated by SAP and its service partners after the introduction of ASAP. In addition, SAP took a more active role in supporting customers' implementation projects and required the involvement of an SAP representative in all projects. The initiative was met with mixed feelings.

Social Interaction:

- *Situational logics*: Implementation partners with their own interests and differentiated resources in an SAP implementation context were disadvantageous and affected customer satisfaction, the performance in the implementation process and the quality of the implemented SAP product. A *comprehensive adaptation* occurred in the SAP implementation context through a connective extension of the implementation methodology content with organizational, coordination and production support provided by a dedicated team. A platform of diversified and specialised but complementary resources were recommended and endorsed through certification programs in the implementation context.
- *Agents' stances*: In concentrating on sustaining satisfactory implementation performance, implementation partners were active in capitalising on availabilities and circumventing constraints. Due to autonomous reflexivity, delineated by an ultimate concern on proficiency and feasible performance achievements, SAP took a strategic stance toward its implementation context and connected specialized and diversified resources in a comprehensive platform of services and resources. Aware of the limitations and benefits of an SAP implementation, a dedicated team harnessed the compliance of various resources and circumvented certain constraints through an active and coordinated involvement in a *power-induced interaction*.

Structural Elaboration: The effect of a comprehensive adaptation, entailing the connective extension of implementation methodology content and a power-induced interaction coordinated by SAP, contributed to an *infrastructural configuration* of implementation methodology by a strategic implementation team in a situation of offensive opportunism. A strategic implementation team with particular interests in task and productivity achievements was promoting a specialization of distinctive roles and diversified distribution of resources. This structure of contingent and complementary roles and resources was accompanied by a culture with contingent and complementary ideas legitimized by implementation partners and an increasing number of customers. Intensification of sectional and divergent interests and reduction of interaction among implementation partners emerged as unintended side-effects.

This section has presented the answer to the first research question: *What implementation methodology adoption configurations are actualized in the context of an ES implementer organization?* The four adoption configurations identified are:

A *fragmented IM adoption* is enabled by the interplay between a reactive interaction and selective adaptation taking place in an ES implementation with a limited IM content, centralised organization with interlocking roles and interchangeable personnel, concentrated distribution of resources, and syncretic ideas that gain sponsorship from customers.

An *aggregated IM adoption* is enabled by the interplay between a cooperative interaction and horizontally expansive adaptation taking place in an ES implementation with an extended IM content but with risk of inconsistencies, centralised organisation of integrated roles, differentiated distribution of resources, and systematised ideas that gain sponsorship from customers.

An *integrated IM adoption* is enabled by the interplay between a collaborative interaction and vertically expansive adaptation taking place in an ES implementation with an extended IM content, distributed organisation of differentiated roles, differentiated distribution of resources, and systematised ideas that gain sponsorship from customers and are legitimised by allied partners.

An *infrastructural IM adoption* is enabled by the interplay between a coordinated interaction and comprehensive adaptation taking place in an ES implementation with extended IM content, centralised organisation of differentiated roles, and differentiated distribution of diversified resources, and specialised ideas that gain sponsorship from customers and are legitimised by partners.

Discussions

To answer the second research question: *How are implementation methodology adoption configurations generated over time?*, we develop a four-category taxonomy. The taxonomy yields insights into patterns of IM adoption configuration.

Based on the above, we through our analysis are able to identify the circumstances under which the interplay between situational logics and implementers' (agents') stances engenders changes in IM adoption and thereby contributes to variations in IM instantiations. By theorizing about IM adoption as constituted by the dimensions of adaptation and interaction generated by the interplay between situational logics and implementers' (agents') stances it is possible to identify four basic patterns which can be illustrated as a four-category taxonomy:

1. *Reorienting,* which takes place in a situation of *corrective protection,* contributes to a *fragmented* configuration and involves a *selective adaptation* achieved through a reorienting extension of content and a *power-induced interaction* achieved through a control of passive implementers;
2. *Embedding*, which takes place in a situation of *defensive protection*, contributes to an *aggregated* configuration and involves a *selective adaptation* realised through a horizontal extension of content and an *exchange-induced interaction* realised through cooperation of evasive partners;
3. *Aligning*, which takes place in a situation of *protective opportunism*, contributes to an *integrated configuration* and involves a *comprehensive adaptation* involving a vertical extension of content and an *exchange-induced interaction* realised through collaboration of a subversive team; and
4. *Connecting*, which takes place in a situation of *offensive opportunism*, contributes to an *infrastructural* configuration and involves a *comprehensive adaptation* consisting of a connective extension of content into a platform and a *power-induced interaction* attained by a strategic team through coordination.

The taxonomy yields insights into patterns of IM adoption configuration and is intended to provide a classification of potential patterns rather than a sequence and a list of all possible patterns. With regard to this sequence some tendencies are worth noting. Firstly, the first two patterns denote situations of protection, which in conjunction with corrective or defensive agential activities contribute to reproduction of social context. The latter patterns denote situations of opportunism, which in conjunction with protective or offensive agential activities, contribute to a transformation of social context. Secondly, the first and the last patterns indicate a productivity-oriented agency whose individualized concerns are placed within an organization's own action context. By contrast, the second and the third patterns indicate a relationship-oriented agency whose main concerns is on preservation or transformation of collectively shared action concerns.

The realist conceptualization applied in this paper exemplifies how a morphogenetic approach might be used to provide a coherent view on variations in IM instantiations and adoption configurations over time, and to add more precision in describing and explaining potential IM adoption configuration patterns that contribute to these variations.

Conclusion and further research

This study has provided an alternative conceptualization and a potential description and explanation of implementation methodology adoption configurations, informed by a RST underpinned by a CR perspective. The following research questions are answered:

RQ1: What implementation methodology adoption configurations are actualized in the context of an ES implementer organization?

Four theoretically and empirically grounded implementation methodology adoption configurations with related conditions have been identified: *fragmented*, *aggregated*, *integrated* and *infrastructural*.

RQ2: How are implementation methodology adoption configurations generated over time?

The IM adoption configurations generated by *reorienting, embedding*, *aligning* and *connecting* patterns might evolve from a reorienting pattern through embedding and aligning to a connecting pattern.

Despite its complexity, RST facilitates an emergent and stratified account of an IM and thereby providing a potential explanation for the instantiation of IM and its adoption configurations generated over time. Three things have been achieved in applying the suggested conceptualization. First, it has supported the researchers in identifying particular IM adoption configurations by taking into account the process contributing to them. Second, it has allowed the researchers to distinguish different situational logics and stances of agents toward particular situational logics and examine their interplay over time. Thirdly, theoretically- and empirically-grounded IM adoption configurations with related conditions have been identified. While there is much research still to be carried out on this subject, this study offers a foundation for future work that may contribute to a more coherent view of IM instantiations as manifestations of IM adoption configuration and formulating design propositions which might provide high-level guidance for practitioners in adopting implementation methodologies. Further work can study how other socio-technical IS packages are adopted, for example, ITIL, CMMI, and COBIT.

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