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## **DIGITAL TRANSFORMATION PROGRAMS - CONTROL IN THE CONTEXT OF AGILE AND TRADITIONAL APPROACHES: A MULTIPLE-CASE STUDY**

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# **DIGITAL TRANSFORMATION PROGRAMS - CONTROL IN THE CONTEXT OF AGILE AND TRADITIONAL APPROACHES: A MULTIPLE-CASE STUDY**

*Research full-length paper*

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## **Abstract**

*Over the last years, digital transformation in organizations has been accompanied by a rise of agile principles and methodologies. Despite some few exceptions, the majority of organizations need to combine or manage the coexistence of agile and traditional management approaches to explore new digital technologies, exploit their benefits, and innovate business successfully. Up to the present, it is not well understood how organizations deal with both approaches within digital transformation programs. Drawing on control theory and the concept of ambidexterity, the purpose of this multiple-case study is to explore how traditional and agile components are managed within large digital transformation programs, what formal modes and styles of control are conducted, and which tensions in control arise. Besides identifying authoritative and enabling control modes, as well as for instance tensions concerning transparency and cadence of outcome delivery, the important dual and “translating” role of the program manager regarding control is emphasized through this study.*

*Keywords: Digital transformation program, agile, control, case study.*

## 1 Introduction

In the era of digitalization, most organizations have been undergoing fundamental transformations. Besides technological changes, digital transformation typically brings about business and organizational changes. In large organizations, transformation endeavors are often put into practice via large programs consisting of several projects consuming considerable shares of organizational capital expenditure (De Reyck et al., 2005; Reich, Gemino, & Sauer, 2008). Conducting digital transformation programs is complex (Matt, Hess, Benlian, & Wiesbock, 2016; Purchase, Parry, Valerdi, Nightingale, & Mills, 2011). Furthermore, the failure rate of IS projects in general (Lagstedt & Dahlberg, 2018; TheStandishGroup, 2016) and specifically transformation projects (Ward & Uhl, 2012) has remained at a high level, despite the rising prevalence of project and program management methodologies and skilled workforce. Due to the close operational and strategic interplay of business and IT (Henderson & Venkatraman, 1993) a central requirement to digital transformation programs is to meet the challenges of aligning business and IT strategies. Another central requirement to digital transformation programs, which can be traced back to the considerable rise of agile methods over the last decade, is aligning traditional and agile approaches. While both traditional and agile methodologies have a long history, it is evident that the latter have gained momentum and are considered as the new mainstream not only in software development (Dingsøyr, Nerur, Balijepally, & Moe, 2012; Theocharis, Kuhrmann, Münch, & Diebold, 2015), but also in project management in general when looking for a way to successfully deal with uncertainty arising from an ever-changing environment (Hobbs & Petit, 2017; Rico, 2010). Nevertheless, traditional methods are not expected to being fully replaced, but rather accompanied by or combined with agile methods “[...]as there exist settings in which agile methods are either not (fully) applicable or cannot show their strength” (Theocharis et al., 2015, p. 150). Studies in the fields of both software development (Kuhrmann & Fernández, 2015; Theocharis et al., 2015; Vijayasarathy & Butler, 2016) and project management (Conforto & Amaral, 2016; Hobbs & Petit, 2017) indicate that a coexistence or combination of traditional and agile methods characterise current management practice. Thus, besides business/IT alignment, when it comes to management methodologies digital transformation programs require agile/traditional alignment. Although there is quite a body of knowledge about the adaption and adoption of agile methods in software development (Barlow et al., 2011; Boehm & Turner, 2005) and large IS projects (Hobbs & Petit, 2017; Rico, 2010) it is not well understood how organizations deal with agile and traditional approaches within digital transformation programs. Drawing on control theory and the concept of ambidexterity, the purpose of this multiple-case study is to explore how traditional and agile components are managed within digital transformation programs, what formal modes and styles of control are conducted, and what tensions in control arise in the program. This interest is reflected through three research questions. Their elaboration is outlined in the following paragraphs.

Over the last years, studies about project management in the context of agile and traditional approaches have continuously been increasing (Hobbs & Petit, 2017). At the same time, there has been some research about program management (Gregory, Keil, Muntermann, & Mähring, 2015; Lahrmann, Labusch, Winter, & Uhl, 2012; Martinsuo & Hoverfält, 2018), but mostly ignoring agile and traditional approaches coming together. Following the call for research to further develop program management towards an organizational capability as intensifying dynamics in the organizational contexts are increasing the importance of an organizations’ ability to change (Martinsuo & Hoverfält, 2018) and to contribute to closing the gap of knowledge regarding the management of digital transformation programs comprising of agile and traditional components the following first research question is posed:

*RQ1: How do applied program management methodologies deal with digital transformation programs which comprise traditional and agile components?*

According to Matt, Hess, and Benlian (2015) a critical issue to an organizations digital transformation is not only developing a proper digital strategy, but also to establish appropriate practices to control the transformation. Wiener, Mähring, Remus, and Saunders (2016) even state that a lack of control contributes to project failure and that it is thus important to increase knowledge on this topic to improve the success rate of future IS endeavors. Up to date, it is underexplored how digital transformation programs incorporating both agile and traditional components are controlled regarding mode and style, which leads to the second research question:

*RQ2: How is control of digital transformation programs consisting of traditional and agile components conducted with regard to control mode and style?*

As the paradigm of agile and traditional is fundamentally different (Boehm & Turner, 2004; Fernandez & Fernandez, 2008; Vinekar, Slinkman, & Nerur, 2006), with the first being change-driven and the latter being stability-driven (Boehm & Turner, 2004) it is expected that tensions regarding control will occur when realizing a digital transformation program consisting of both components. As programs require both stability and change (Gregory et al., 2015) an ambidextrous perspective towards tensions in control of digital transformation programs comprising of agile and traditional components seems to be a suitable approach. Previous research suggests that managers generally prefer stability and thus traditional approaches over agile approaches (de O. Melo et al., 2013; Serrador & Pinto, 2015) and programs can exhibit a clash between program control and project autonomy (Gregory et al., 2015), but in none of these studies are the findings regarding agile/traditional management and program control tensions integrated. Thus, the following last research question is posed:

*RQ3: What tensions in control occur in digital transformation programs consisting of traditional and agile components?*

The present paper is organized as follows: While chapter 2 lays the conceptual and terminological foundation, chapter 3 introduces the theoretical framework of the study. In chapter 4 the research methodology is described and in chapter 5 the results within the single revelatory cases are presented. These results are than analysed and discussed in chapter 6 followed by the concluding chapter 7 outlining contributions and implications as well as limitations of the research.

## **2 Conceptual and terminological foundation**

In this chapter, the basic concepts are outlined considering related work and terminologies that are important for this study are explained.

### **2.1 Control of digital transformation programs**

Projects are a widespread means to organizations to pursuit change. A key rational to group projects into programs is that the intended organizational benefit could not be realized through separate projects managed independently (Lycett, Rassau, & Danson, 2004; Turner & Müller, 2003). A program can consist of projects that existed prior to the program's launch or projects that were set up for the program (Vereecke, Pandelaere, Deschoolmeester, & Stevens, 2003) and are defined as "[...]a temporary organization in which a group of projects are managed together to deliver higher order strategic objectives not delivered by any of the projects on their own." (Turner & Müller, 2003, p. 7). Compared to projects, programs show a higher level of complexity and uncertainty (Gregory et al., 2015; Pellegrinelli, 1997) with objectives being less specific and measurable (Turner & Müller, 2003), which influences control. A digital transformation program is a particular type of program involving the aim to achieve IS, business and organizational change (Gregory et al., 2015; Matt et al., 2016; Purchase et al., 2011). This threefold aim is a typical characteristic of digital transformation programs compared to IS programs only focusing on changing IS or organizational transformation programs only focusing on

organizational change (Barthel & Hess, 2019). These are central factors to be considered when setting up an appropriate management for digital transformation programs (Nieminen & Lehtonen, 2008). As within programs the local perspective (of each project) needs to be aligned with the global perspective (of the program and the organization) (Lycett et al., 2004; Vuorinen & Martinsuo, 2018), control plays a central role, also regarding successful completion (Gregory et al., 2015; Vuorinen & Martinsuo, 2018). Control can be understood as a dyadic process, in which a controller steers or adjust the behaviors of his or her contolees (Choudhury and Sabherwal 2003) in an attempt to achieve an alignment of individual (local) behavior with organizational (global) goals (Ouchi, 1979). Control of programs typically spans from the program governance level (i.e. program sponsor), over the program management level (i.e. program manager) to the project management level (i.e. project managers) (Gregory et al., 2015; Lycett et al., 2004). Thus, a program manager has a dual role when it comes to control: He or she can be a contolee (by the program sponsor) as well as a controller (of the project manager). Figure 1 shows how program control of programs is conceptualized in this study (see Figure 1).

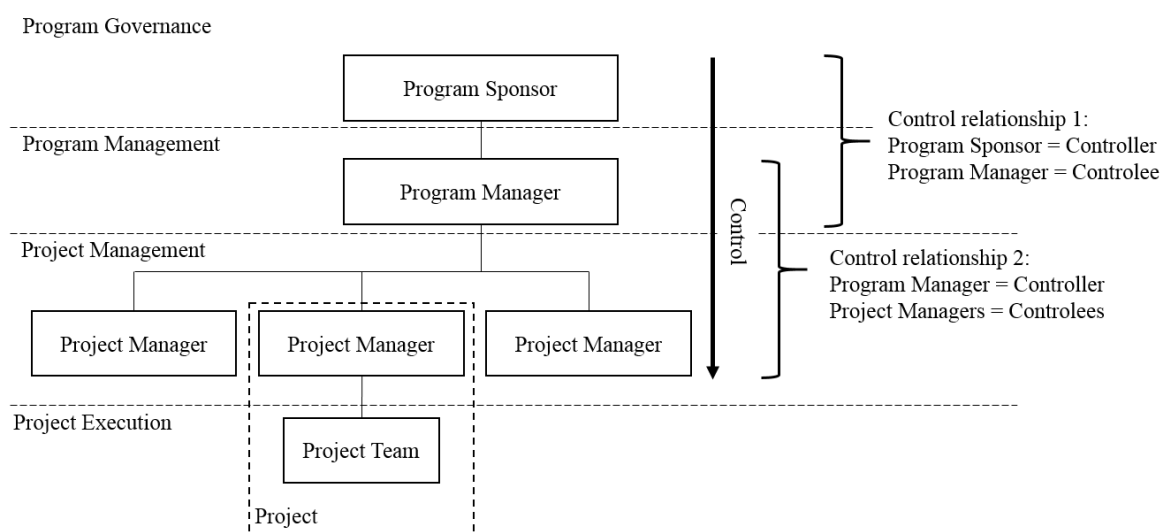


Figure 1. Control of program

According to Lycett et al. (2004), similarly to projects, a program's lifecycle consists of an identification, definition, execution, and closure stage. As projects are run in the program's execution stage, control from the program manager over the project managers starts then. Thus, this study focuses on control in the execution stage of programs.

Control of digital transformation programs is important for successful program progression but at the same time challenging, as the programs are complex, non-routine temporary organizations encompassing ambiguity and uncertainty due to possible changes of priorities, goals, contextual factors, stakeholder involvement, and team compositions (Kirsch, 2004; Wiener et al., 2016). In literature, there are many studies focusing on control in IS projects (Choudhury & Sabherwal, 2003; Wiener et al., 2016), even with emphasis in agile contexts (Harris, Collins, & Hevner, 2009), and some studies about control of programs (Gregory et al., 2015; Martinsuo & Hoverfält, 2018; Nieminen & Lehtonen, 2008; Vuorinen & Martinsuo, 2018), but none of them explicitly focuses on the dual role of the program manager. Furthermore, Wiener et al. (2016) revealed through their systematic literature review about control in IS projects that existing research primarily focuses on control portfolio configurations (i.e. what is controlled) and largely neglects control enactment (i.e. how control is put into practice). Together with the finding that there are only a few contributions to the understanding of control in digital transformation programs (Nieminen & Lehtonen, 2008; Vuorinen & Martinsuo, 2018), it can be said

that there is a considerable lack of research on how control in digital transformation programs comprising of both agile and traditional components is actually taking place and what tensions occur.

## **2.2 Coexistence and combination of agile and traditional approaches**

While most of the program management methods found in practice follow a waterfall idea and traditional control structures (Lycett et al., 2004), programs often contain both traditional and agile approaches, especially on the single project level. Traditional approaches can be defined as stability-driven following the assumption that objectives and deliverables of an endeavor can (or need to) be clearly defined upfront. Before the execution of a next stage begins, objectives, functionalities, risks, costs, schedules and resources are defined and planned (Cooper, 1990). Hence, traditional approaches are seen as attempting to minimize change and maximize stability during a projects lifecycle (Vinekar et al., 2006) and prescribing many procedures, and documentation templates in order to control the project's progression (Theocharis et al., 2015). On the other hand, agile approaches assume that change is not only inevitable, but also necessary for a project to produce a useful outcome (Vinekar et al., 2006). They are thus also called change-driven (Dahlberg & Lagstedt, 2018). Agile approaches aim at avoiding "bureaucracy", promote customer collaboration, and self-organizing teams working iteratively towards an outcome (Highsmith & Cockburn, 2001; Rico, 2010; Vinekar et al., 2006). They recommend decentralized decision making and are considered to work well in flat hierarchy settings (Boehm & Turner, 2004). Although agile methods, like Scrum, were initially developed for small projects, they have been scaled to larger project and program settings (Hobbs & Petit, 2017). One of the commonly used frameworks is for instance SAFe (i.e. Scaled Agile Framework), guiding organizations in collaboration, alignment, and delivery across a large number of agile teams (Leffingwell, 2015). Regarding control, traditional and agile approaches have different implications. As in other IS endeavors, resolute management control is considered as suitable when there are fixed budgets, time constraints, and strict requirements (e.g. regulatory, safety-critical, architectural) (Harris et al., 2009). In agile settings on the other hand, flexibility to change project plans and deliverables are needed (Harris et al., 2009; Serrador & Pinto, 2015). In this context, Serrador and Pinto (2015) for instance point out that a critical issue "[...]lies in the mismatch between the desire for early specification freeze and fixed plans with the concomitant need to maintain sufficient flexibility to modify and alter project plans to address critical business needs." Although there has been a lot of research and practitioner discussions around the controversy of agile and traditional approaches underlining a dichotomous view (Fernandez & Fernandez, 2008), there is also evidence that both approaches are compatible in different types of endeavors (Boehm & Turner, 2004; Cooper & Sommer, 2016). On the one hand there are suggestions to a dualistic view and to build up a management that accommodates the coexistence of both approaches separately instead of replacing one by the other (Vinekar et al., 2006). On the other hand there are researchers who propose an integrated approach (Boehm & Turner, 2004; West, 2011), which is often referred to as hybrid methodology. Especially in the field of IS development, hybrid methods are often considered more successful than other methods particularly in large organizations as benefits of agile like adaptability can be realized without abandoning stability (Barlow et al., 2011; Boehm & Turner, 2004). A hybrid methodology that is gaining popularity in IS project practice is Water-Scrum-Fall (Schauderer, Overhage, & Fehrenbach, 2015; Theocharis et al., 2015; West, 2011). This methodology contains waterfall (traditional) steps in the beginning and at the end of a project and Scrum (agile) steps in the middle, during implementation (West, 2011). Despite the wide-ranging contributions within the field of software and IS development, there is a lack of research on the coexistence and combination of agile and traditional approaches in digital transformation programs, which this study tries to address.

## **3 Theoretical Foundation**

To explore control of digital transformation programs that comprise both agile and traditional components two theoretical lenses are employed. Control theory serves to identify different modes and styles

of control, whereas ambidexterity is used as a perspective towards the identified tensions in control when agile and traditional approaches meet. Control theory as a lens has been selected because many studies show that it is a valuable theory to gain a deeper understanding about control in project settings, but at the same time it has not been applied to such a great extend in program settings and there is hardly any study using it as a reference theory in agile/traditional program settings (Wiener et al., 2016). Regarding ambidexterity, several researchers have advocated this concept as a means to realize benefits of agile and traditional approaches (Ramesh, Mohan, & Cao, 2012; Vinekar et al., 2006). Thus, ambidexterity is considered as a suitable additional lens for this study.

### 3.1 Control Theory

Control theory is based on the dyadic view of control being performed by a controller to regulate and adjust the behavior of a contree (Choudhury & Sabherwal, 2003). There are five different control modes: input, behavior, outcome, clan, and self-control (Henderson & Lee, 1992; Jaworski, 1988; Kirsch, 1997; Ouchi, 1979).

Mode	Key Characteristics	Authoritative mechanism enactment (example)	Enabling mechanism enactment (example)
Input	The controller specifies, monitors, and manipulates allocation of financial, human, and material resources. The contree is rewarded or sanctioned for his/her ability to utilize the available resources.	The controller (program manager) defines manpower allotment and thus prescribes the contree (project manager) who is in a team	The controller (program manager) engages the contree (project manager) in a dialog to define manpower allotment.
Behavior	The controller prescribes processes, procedures, and rules. The contree is rewarded or sanctioned based on his/her compliance to the specified behavior.	The controller (program sponsor) prescribes the contree (program manager) the use of a certain program reporting method	The controller (program sponsor) discusses various program reporting methods with the program manager- in the end they mutually decide which one is to be used.
Outcome	The controller specifies and evaluates both interim and final outputs. The contree is rewarded or sanctioned based on the delivered outputs	The controller (program sponsor) defines program milestones and makes clear to the contree (program manager) that they are not negotiable.	The controller (program sponsor) invites the contree (program manager) to (re-)define milestones together.
Clan	The values and norms shared in a group of individuals who are interdependent (i.e. clan) motivates a contree's behavior. Although clan control is primarily implemented by contrees, the controller can promote the development of shared values and norms.	The controller (program manager) requests all contrees (project teams) to develop a shared norm of mandatory meeting attendance (e.g. rituals)	The controller (program manager) invites all contrees (project teams) to a monthly lunch where an open discussion and socialization among project team members is promoted.

Table 1. Control modes and style examples (based on Choudhury and Sabherwal (2003); Kirsch (1997); Ouchi (1979); Wiener et al. (2016))

While the first three are considered as formal, the remaining two represent informal modes of control (Jaworski, 1988). As the focus of this studies is on analysing control over program on program level in general, self-control referring to the individual level is excluded. Wiener et al. (2016) refer to the modes of control as parts of a control portfolio configuration and, in addition, emphasises the concept of control style as part of control enactment. Control style is understood as "[...]the manner in which the interaction between the controller and the contree is conducted" (Wiener et al., 2016, p. 28). There are two control styles: authoritative and enabling. Authoritative control is a top-down control style that relies on bureaucratic values and is designed to ensure or enforce compliant contree behav-

ior without giving the controlee any influence on how control is taking place (Adler & Borys, 1996; Gregory & Keil, 2014). Enabling control on the other hand is a collaborative control style that is designed to ensure compliant controlee behavior through allowing the controlee to deal with contingencies and frequently interact with the controller (Adler & Borys, 1996; Gregory & Keil, 2014). Both control styles apply for formal and informal controls (Wiener et al., 2016) (see Table 1).

### **3.2 Ambidexterity in programs**

Ambidexterity is a capability that has originally been called for in organizational sciences to address contrasting demands when it comes to change (Gibson & Birkinshaw, 2004; Raisch, Birkinshaw, Probst, & Tushman, 2009). Contrasting demands are for example referred to as the paradox of exploitation and exploration (Gibson & Birkinshaw, 2004; March, 1991), alignment and adaptability, as well as stability and change (Gibson & Birkinshaw, 2004). The ability to be adaptive to the changing and to be aligned with the existing environment is positively associated with successful change (Gibson & Birkinshaw, 2004). Contributions in this field also evoke a strong basis for a management approach being able to cope with agile and traditional approaches simultaneously (Tushman & O'Reilly, 1996; Vinekar et al., 2006). Whereas agility is needed for organizational adaption, stability is needed for organizational optimization (Vinekar et al., 2006). Thus, digitalization programs as temporary organizations require an ambidextrous approach (Gregory et al., 2015), also towards control. Nevertheless, organizational and managerial factors, like control modes and styles, can give rise to tensions to the simultaneous pursuit of agile and traditional endeavors (Vinekar et al., 2006).

## **4 Methodology**

Due to the novelty of the topic and the lack of prior research on control of digital transformation projects comprising of agile and traditional components this research aimed at understanding the phenomenon in its real context. Therefore, a qualitative research design following an in-depth multiple-case study approach was chosen (Eisenhardt, 1989; Yin, 2009). A multiple-case design enables the possibility for more generalizability and the advancement of theory through cross-case analysis (Eisenhardt, 1989; Miles, Huberman, & Salanda, 2003).

### **4.1 Case selection**

The case selection was guided by a reflection on the cases' expediency to gain revelatory insights (Yin, 2009). With regard to answering the research question, three large digital transformation programs, which (1) were embedded in a large, traditional parent organization with high project and program management maturity, (2) comprised agile and traditional management components, and (3) offered sufficient availability of relevant information were selected. Due to a long-lasting relationship with the three parent organizations of the programs (through our competence center for knowledge and experience exchange on the topic of digital transformation between scholars and practitioners) the fulfilment of the abovementioned criteria could be assessed accurately. According to Mintzberg (1979) an organization with 2'000 employees is considered as large, typically characterized by specialization and formalization. All organizations are based and mainly operate in Switzerland. The case programs all aimed at not only significantly changing information systems, but also at changing the structures, processes and IT infrastructure of the parent organization. To guarantee anonymity of the cases, content and objectives of the program is only given on a generic level. At the time of study all programs were at the realization stage. An overview of the selected cases is presented in Table 2.

### **4.2 Data collection and analysis**

Empirical data on the digital transformation programs was collected during eight weeks in spring 2019 through three main sources: (1) semi-structured interviews with program managers (and in two cases with their program management officer); (2) informal follow-up e-mails and skype calls; and (3) sec-



ondary data including public (e.g. information on organization website; official external audit reports) and internal material (e.g. organigrams; steering meeting protocols; management guidelines). For each of the three cases two interviews were conducted, which resulted in a total of 5 interviews lasting 60 to 90 minutes. After transcribing the recorded interviews follow-up questions were posed to several interviewees via e-mail or skype calls. The design of the semi-structured interview guide drew upon the recommendations of Schultze and Avital (2011) and split in two parts: While the first part had an open, exploring character to obtain rich information about the program's processes and context, the second part was more focused on control to get insights on how agile and traditional approaches are related to each other and how control is conducted. As the interest of the inquiry lied on program management processes and control interviewees representing the program management level (e.g. program manager or PMO manager) were selected (see Table 2).

	<b>Case / Program A</b>	<b>Case / Program B</b>	<b>Case / Program C</b>
<b>Parent Organization</b>	Financial service provider (~5000 employees)	Logistics service provider (~40'000 employees)	Security service provider (~10'000 employees)
<b>Content</b>	Upgrading and integration of IS across whole organization; development of new products; organizational change	Upgrading and integration of IS along the organization's value streams; organizational change	Upgrading and integration of IS across whole organization; development of new products; organizational change
<b>Objective</b>	Focus on customer processes; efficiency in business processes; integrating IS	Transparency; establish a up-to-date basis for financial management; integrating IS	Efficiency in business processes; integrating IS
<b>Duration (in y)</b>	6	4	8
<b>Cost (in million U.S. dollars)</b>	~200	~100	~400
<b>Outcome uncertainty</b>	Average	Average	Average
<b>Number of projects</b>	5	5	7
<b>Interviewee</b>	Program manager	Program manager; Program management officer	Program manager; Program management officer

Table 2. Description of the Case Programs

Drawing on the recommendations of Eisenhardt (1989) a coding scheme based on the two theoretical lenses was developed and applied. Codes informed by control theory represented the outlined control modes and styles. Codes informed by ambidexterity represented the outlined duality of stability and change in the field of program management. The theory informed data analysis was followed by an open-coding where codes emerged during condensing the transcripts to identify themes (Yin, 2009). The triangulation of the interview findings took place through consultation of other public and internal data sources (e.g. program documents). Interview data was triangulated through consultation of follow-up material data and secondary data in order to mitigate the risk of information bias (Gibbert, Ruigrok, & Wicki, 2008).

## 5 Results

While case C aimed at transforming a part of the organization (business unit), cases A and B aimed at transforming the whole organization. Furthermore, all programs are conducted through both agile and traditional methods in a traditional context. Meaning that the parent organization is organized traditionally, featuring formalized structures and processes, high degree of specialization and distinct hierarchy (Mintzberg, 1979). The programs under study consist of a different number of projects, are expected to last from four to eight years, and cost estimations range from 100 to 400 million U.S. dollars

(see Table 2). In this chapter a short overview of each case structured along the two first research questions is provided. The identification of control modes and styles is structured according to the two previously outlined control relationships (see Figure 1). Due to space constraints the identified tensions in control are solely presented in chapter 6 (cross-case analysis).

## 5.1 Program A

Program A was initialized to accommodate six already existing projects that showed difficulties in progressing successfully towards realizing the organization's digital strategy of harmonizing and integrating processes across the whole organization when managed separately. The program methodology applied is a combination of a - from the parent organization prescribed - program management methodology based on the traditional paradigm and agile paradigm (i.e. SAFe), which has never been applied before. While the overarching program process and structure is kept traditionally consisting of four stages each followed by a milestones as well as a program sponsor and a program manager, the realization is structured in 5 streams, each representing a cross-functional project team covering an end-to-end process, that "works" agile. Every stream is led by a product owner representing the contree controlled by the program manager in control relationship 2. In control relationship 1 the program manager is the contree and the program sponsor the controller. The identified control modes and styles are listed in Table 3.

		Style				Style	
		Authoritative	Enabling			Authoritative	Enabling
Input	Control Relationship 1	Budget definition; Staffing	-	Control Relationship 2		Budget plan definition	Regular dialog with contreees to define staffing
Behavior		Reporting process through periodic reports; Program schedule	-			Reporting process	Use of SAFe practices and rules
Outcome		Definition of final outcome, high-level requirements and milestones	Regular dialog to define and alter interim results			Specification of must requirements (e.g. compliance, security, architecture)	Regular dialog to define and alter product increment and backlog
Clan		Definition of mission statement to be shared	-			Definition of reflection activities	Regular exchange meetings over lunch for socialization

Table 3. Control modes and styles in Program A

## 5.2 Program B

Despite the availability of an "off the shelf" traditional program management methodology, which has been used for many transformation programs before within the parent organization, a hybrid methodology was developed specifically for this program, combining traditional program management with agile management based on SAFe. Similar to program A, this program is structured in 5 streams (or agile project teams), each representing an end-to-end process or value stream of the organization. The program aims at establishing an up-to-date basis for financial management through upgrading and integrating IS along the organization's value streams. The application of a new hybrid methodology to the program is seen as an experiment that according to the interviewed program manager "[...]has been working quite well, but has also been requiring many adjustments on the run and discussions with different involved actors to get everyone on the same page. Finding the right control configuration is an ongoing process, in which I, as program manager, have a key role".

Due to these on-going configurations the identified control modes and styles (see Table 4) could change over the future course of the program realization. As in program A the product owner leading a stream is the controlee and the program manager the controller. Whereas in control relationship 1 the program manager is the controlee controlled by the program sponsor.

		Style				Style	
		Authoritative	Enabling			Authoritative	Enabling
Input	Control Relationship 1	Budget definition	Regular dialog to define staffing	Control Relationship 2		Budget plan definition	Regular dialog to define staffing
Behavior		Reporting process through periodic reports	Set up regular meetings between program sponsor and manager; Set up program schedule			-	Mutually agreed upon reporting process and other SAFE practices and rules
Outcome		Definition of final outcome as vision; Definition of must requirements and milestones	Regular dialog to define and alter interim results			Specification of must requirements (e.g. compliance, security, architecture)	Regular dialog to define and alter product increment and back log
Clan		-	Mutual definition of mission statement and meeting rules			-	Regular exchange meetings to promote common values and norms

Table 4. Control modes and styles in Program B

### 5.3 Program C

Program C is aimed at increasing efficiency of business processes and the innovation of new products and processes.

Mode		Style				Style	
		Authoritative	Enabling			Authoritative	Enabling
Input	Control Relationship 1	Budget definition, staffing	-	Control Relationship 2		Budget plan definition (both groups)	Regular dialog to define staffing (with PO group)
Behavior		Reporting process through periodic reports	Set up of program schedule in dialog			Definition of reporting process (project manager group)	Mutually agreed upon reporting process and other agile practices and rules (PO group)
Outcome		Definition of final outcome and milestones	-			Definition of must requirements (PO group) and milestones (project manager group)	Regular dialog to define and alter deliverables and prioritization (product owner group)
Clan		Definition of mission and rules to be shared	-			-	Regular exchange meetings to promote common values (PO group)

Table 5. Control modes and styles in Program C

As in program B, the projects were set up simultaneously to the program. The program is organized following a traditional program management methodology that has been prescribed by the parent organization for many years and is not designed for programs containing agile projects. Nevertheless, while three projects are managed traditionally, four projects apply agile methods, within the program. Leading to two different groups of controlees controlled by the program manager - project manager leading a traditional and product owner (PO) leading an agile project - in control relationship 2. As in the other two projects in control relationship 1 the role of the controller is represented by the program sponsor and the role of the controlee is represented by the program manager (see Table 5).

## 6 Analysis and discussion

While not claiming to be exhaustive, due to the limited number of cases and data sources within the cases, the program management methodologies, control modes and styles as well as the tensions identified via the in-depth study of the three cases are still valuable to develop some propositions.

### 6.1 Applied program management methodology

Even though all case organizations had mature project and program management methodologies, none of them could apply an „off the shelf” program management methodology that suited the digital transformation program’s processes and structures. The available and in case A and C prescribed methodologies were not suitable for an agile/traditional program setting. Whereas in case B this misfit was recognized before the setup of the program, case A and C had to find ways to deal with it in the running program. Especially case A, which showed a fully agile project execution, had to adapt a lot. One interviewee of this case for instance pointed out that “[...] it was a huge challenge to convince the program sponsor to integrate agile through SAFe. But this was only one step, the next step was to convince him from refraining from some of the control mechanism like prescribed documentation forms and detailed definition of deliverables, which simply would impede agile execution”. Against the background of Theocharis et al. (2015) finding, that organizations apply context-specific hybrid approaches combining agile and traditional approaches in software development, it comes with no surprise, that organizations also design hybrid solutions for the management of digital transformation programs. Nevertheless, it is surprising that none of the studied organizations could fall back to a methodology that only needed to be configured a little. Instead, all programs under study had to set up a new methodology either from scratch, or through many configurations. The attitude towards the program methodology design as an experiment as in case B, seems to be a flexible way to allow learning by doing and thus promising way to find the right agile/traditional alignment in the end. Particularly insights from case C even arouses the hunch that, manager’s think of agile methods to be only suitable to separately managed small projects and not designed for larger contexts and programs, that in their mind need rigorous and meticulous control. Exactly opposite to the suggestion of Lycett et al. (2004) saying that program level should focus on strategic alignment and refrain from overdoing control. As put forth by Hobbs and Petit (2017) in their mixed-method study considering agile methods in large projects in large organizations, this study also indicates that whether and where agile or traditional methods are used in programs is in some ways influenced by the personal preference and assertiveness of involved managers. This portends a certain amount of arbitrariness when it comes to the compilation of management methods within programs influencing the applied program management methodology as a whole. Regarding ambidexterity, all applied program management methodologies show a preference for stability and hence do not (yet) support the needed level of ambidexterity in the management of complex endeavors, like called for by Gregory et al. (2015) for example. This finding is to some extent contrary to the finding of Martinsuo and Hoverfält (2018, p. 143), who conclude that “[...]recent change program management research shows that program management is strongly deviating from the plan-and-control approaches[...]”.

## 6.2 Applied control modes and styles

The results of the study show quite similar control mechanisms across the different modes but apply different control styles. Comparing all three cases it can be suggested, that the more agile components a case shows, the more enabling control is taking place in both control relationships (e.g. Case B). Still all cases show enabling control style across all modes in control relationship 2, indicating that program managers conduct a more collaborative control style towards agile projects or value streams, which is a prerequisite for the proper application of agile methods (Maruping, Venkatesh, & Agarwal, 2009). The program manager in case B states in this context: *“In order not to inhibit agility it is necessary to involve the agile teams in planning processes.”* Furthermore, looking across the whole span of program control from program governance level to project management level, all cases indicate that program managers have a “translating” role between authoritative control of the project sponsor and the enabling and authoritatively addressed controlees at project management level. This finding can be underlined by the following interviewee (program manager case A) statement: *“My role as program manager is actually the role of a translator. I translate for example objectives and the degree of fulfilment between the agile project teams and the project sponsor”*. Moreover, case C shows a program manager who controls both traditional and agile projects simultaneously. This can be linked to a present ambidexterity in control relationship 2.

Based on the findings across the three cases, it is proposed that program management should be viewed as an enabler of ambidexterity within digital transformation programs. Especially, when there is a lot of uncertainty and ambiguity in the program’s contexts, there is a growing need to foster ambidexterity and find alignment between agile and traditional approaches.

## 6.3 Tensions in control

In the following sections the identified control tensions are outlined and discussed. The tensions were all identified primarily through the interviews. To begin with, Case A with the highest agile prevalence and case C with the lowest agile prevalence among the three cases reported on less tensions than case B. Potentially because there were less spots where agile and traditional approaches met and thus less contrasting approaches towards control (Harris et al., 2009).

In the field of outcome control all cases showed a tension regarding fixed outcomes desired by program sponsor and emergent outcomes of the agile working teams. One interviewee (of case A) pointed out that *“the program sponsor is used to monitor performance as the degree of fulfilment of an objective. He is looking for the delta between the things defined and the things delivered. With the emergence of requirements and new tasks integrated to the backlog on the project execution level the objective changes continuously and he doesn’t know anymore against what he can measure the degree of fulfilment or he doesn’t understand why the degree of fulfilment suddenly dropped from 90 to 75 percent”*. This tension can also be connected to the different cadences of output delivery and changes made to the objective. Agile approaches are iterative and thus show a higher cadence (Vinekar et al., 2006). Furthermore tensions in the field of outcome control were in one case related to the increased transparency coming from agile practices (e.g. the use of Kanban board or daily updated backlogs) and the delivery of intermediate results or products. *“In traditional settings a program sponsor and manager sees too less for too long, whereas in agile settings they see too much too soon.”* as an interviewee of case A pointed out. Regarding input control case B reported tensions in resource planning. Nevertheless, where input planning was done in an enabling manner, for instance in all case programs in control relationship 2 regarding staffing, this tension was seen as less crucial. In the field of behavior control, the definition of traditional reporting processes by the sponsor is seen as causing tensions towards the agile principle of “only as much documentation as needed”. Even in Case C where there is a hybrid program methodology specially designed for the agile/traditional program this tension is reported. In the field of clan control, in both control relationships no tensions were identified through the three cases.

All the above mentioned tensions can be based on the duality of stability and change as well as program control and project autonomy as also identified by (Gregory et al., 2015). Although not focus of this study the two interviewees of case C indicated two reasons for the tension in control: lack of mutual understanding as well as trust of the traditional oriented project sponsor and the agile oriented project execution teams. This could be a hint towards the direction of further investigation.

## **7 Conclusion**

Despite the widespread use of traditional and agile project management approaches within large digital transformation programs in large organizations, it is not well understood how organizations actually manage traditional and agile components especially with respect to control. This research not only uncovers how traditional and agile project management components are combined respectively how their coexistence is managed, but also shows how control takes place, and which tensions arise. The presented multiple-case study consisting of revelatory cases provides both guidance to further research by uncovering pressing questions and inspirations for managerial actions which contributes to the successful realization of digital transformation endeavors.

This study takes a step in both further establishing ambidexterity and control theory as a lens in digital transformation programs. There has been limited research on understanding how ambidextrous capabilities regarding stability and change could be developed to control programs with an agile/traditional setup. Especially the program manager with his “translating” role is identified as having a central role when trying to manage conflicting (control) demands in agile and traditional components. This could also be a valuable insights for practitioners trying to increase ambidextrous capabilities in digital transformation.

While this study was not explicitly looking for possible reasons for tensions, lack of mutual understanding and trust were identified. Further investigations could focus on uncovering more and deepen the understanding of tensions and their source. A next step could also be to look for and elaborating solutions to the tensions. When consulting literature there are suggestions on where to focus. For instance, from an organizational theory perspective it has been claimed that unless there is a shift from management approaches only informed by a stability view towards management approaches where change is viewed as an inherent, ongoing process within change programs it will be difficult to achieve change successfully (Tsoukas & Chia, 2002). This means that digital transformation programs need to be changed on an ongoing basis and “made to work” through fine-tuning and adjustment to the context (Tsoukas & Chia, 2002). Farjoun (2010) goes one step further and claims that stability and change need to be viewed as interdependent and mutually enabling. Within a digital transformation program this would mean that unless there is an appropriate management approach combining and aligning agile (change view) and traditional (stability view) methods change cannot be achieved.

To better understand control of digital transformation programs it would also be valuable to incorporate more perspectives. Despite integrating the controller and controlee view in programs (as the program management level has this dual role), the tensions only represent the perspectives of program manager and program management offices. It would be an appropriate next step to investigate tensions also from program sponsor and project manager (or product owner) perspective to get to a fuller understanding of the topic. Furthermore, it would also be valuable to understand the interplay between the control modes and styles as suggested by Wiener et al. (2016).

As this study is a revelatory case study investigating three cases, it cannot be claimed that the exploration of control modes and styles as well as tensions is exhaustive. Moreover, generalizability is limited. To make the findings more exhaustive and generalizable further cases could be investigated qualitatively and / or a quantitative study could be conducted.

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