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IT program management challenges: insights from programs that ran into difficulties

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Abstract:
The use of Information Technology (IT) to drive organizational change has gained momentum in both for-profit and not-for-profit organizations, and currently culminates in a vivid discussion on what many call "Digital Transformation". It is not surprising then that practitioners seek guidance on how to manage such transformation. Professional bodies have addressed this need by issuing best practice standards for Program Management (PgM), but we know little about their value in managing programs in general and IT programs in particular. Academic research on IT PgM is still in its very infancy. Taking this as motivation, we have investigated the challenges that managers faced in five IT programs that encountered problems. Our analysis reveals a set of management issues and shortcomings including, among others, a lack of architectural overview, difficulties in dealing with scope changes, stakeholder interest, diverse business groups and cultures, as well as a lack of internal PgM competences and unclear management responsibilities. In this paper, based on our findings, we present a first checklist for managing IT programs across their life cycle. Though still tentative and not necessarily comprehensive, we were able to confirm that our checklist provides relevant guidance for managing IT programs in practice.

Keywords:
IT program; IT project; IT program management; IT project management; IT-based infrastructure; organizational change; Technochange.

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1. Introduction

The rapid pace of development in Information Technology (IT) directly and indirectly shapes the turbulent economic environment and societal disruptions we face today. The use of prefixes such as "Information" or "Digital" in combination with "Age", "Society", or "Economy" highlight the role of IT as a fundamental driver of societal and economic change. In this situation, organizations cannot help but embrace IT as an important enabler and catalyst for continually adapting to such changing conditions and reinventing themselves. Consequently, the use of IT to drive organizational change has gained momentum in both for-profit and not-for-profit organizations throughout the past years [1, 2]. The practical relevance of this issue is also evidenced by the running debate on "Digital Transformation", which is highly topical and prominent in IT management consulting and professional magazines alike [3, 4].

While Information Systems (IS) researchers widely acknowledge the importance of studying interrelationship between IT and organizational transformation [5, 6], they are just beginning to investigate this relationship in detail. A literature study by Besson and Rowe [6, p. 108], which investigated 29 academic journals over a 16-year period from 1995 to 2011, was not able to identify more than 62 papers in total that dealt with this topic in some way. Of these 62 contributions, the vast majority were devoted to "IT fashions" [7] such as Application Service Providing, Business Process Reengineering, Customer Relationship Management, E-Commerce, Groupware, Knowledge Management, Data Warehouse and Enterprise Resource Planning [6, p. 114]. Additional publications either focused on single cases and specific IT applications or tackled the phenomenon of IT transformation only conceptually. While such research provides some insight into the diverse challenges of implementing IT in organizations, it is far from providing a common theory base to guide managers in leading IT-driven change initiatives successfully.

The academic debate on IT-based organizational change and, in particular, the emerging debate on "Technochange" clearly acknowledge such a lack of theory. The term "Technochange" has been coined by Markus [8] to refer to the use of "IT in ways that can trigger major organizational changes". It acknowledges that IT is not only a given technology that can be "introduced" into the organization, but in many cases challenges established organizational arrangements, routines, and practices. Technochange researchers assume that such change is not well addressed by the established discipline of organizational change management which tends to misconceive IT as a given, "deterministic artefact" thus ignoring the organization's potential to interpret, appropriate and ultimately shape its use in a variety of ways [9]. At the same time, they doubt that Technochange can be brought about by IT projects alone, because such projects have typically been viewed as "exercises in technical change, rather than socio-technical change" [9, p. 2]. As such, IT projects center on the implementation and delivery of an IT product, and only then, if at all, worry about its adaption in a specific organizational context [8]. In sum, Technochange researchers hold that "merely combining IT project management and organizational change management approaches does not produce the best results" [8, p. 4]. In response, they prompt for integrating and extending traditional research into organizational change management and IT project management to address the specific challenges posed. Unfortunately, such research is still in its infancy and hence not yet able to provide managers with practical recommendations and effective practices for managing IT-based change initiatives [9, 6].

Given the crucial role that Technochange plays in the digital transformation of today's organizations, practitioners are urgently seeking guidance on how to manage such change. In professional practice, Program Management (PgM) has emerged as an approach to fill this need. Professional institutions such as the Project Management Institute (PMI) and the Office of Government Commerce (OGC) have promoted PgM as a field of professional training and expertise for more than 20 years. They have also issued related bodies of knowledge in several editions [10, 11], which clearly indicate the widespread incidence of PgM in practice. PgM as an approach is specifically devoted to large-scale organizational endeavors above the project level and, in particular, broad change and transformation initiatives [12, 13, 14]. It is therefore surprising that academia so far has paid little attention to the PgM approach to bring about IT-based organizational change. In an extensive literature review, we were not able to identify more than a handful of studies specifically concerned with IT program and their management. One early study presents a list of skills for and competencies of successful program managers based on experiences made, among others, in the IT industry [15]. Two

further studies investigate management challenges in a single programs in detail. One is concerned with the implementation of a large-scale standard software solution [16], the other with an IT transformation program [17]. The latter study has a narrow focus on challenges caused by paradox and ambidexterity in programs. A final study by Jiang et al. [18] builds on survey data of 183 firms, but has an even narrower focus on conflicts and specific aspects of conflict management in IT programs.

In face of the challenges imposed by digital transformation and the role of IT as a driver of organizational change, we perceive a strong need to widen our understanding of IT programs and the management challenges involved. In response, we analyzed the challenges in five different IT programs that ran into difficulties, pursuing two research objectives:

- First, we intended to lay a broader empirical basis for understanding the challenges involved in IT PgM with respect to both the number of studied programs and the range of management challenges included.
- Second, based on a more comprehensive understanding of IT PgM challenges, we sought initial insight into how managers can and do respond effectively.

We present our empirical investigation and the resulting findings as follows: We begin by clarifying the terms IT project and program and by delineating the associated management domains of Project Management (PM) and Program Management (PgM). In the third section, we describe our research approach and the data basis of our exploratory empirical study. In the fourth section, we present practical insights from our case studies in an actionable way. We do this by discussing challenges that the IT program managers in our five cases had to face. In addition, we introduce the reader to ways that program managers responded to these changes. In a last section, we summarize the contribution of our study and draw conclusions for practice.

2. Managing IT-based Change through Programs and Projects

IT PgM is quite a new concern in Information Systems research and the academic debate still suffers from some ambiguity surrounding the notion of an IT program. Ribbers and Schoo [16], for example, emphasize technical features as being characteristic of an IT program, while Gregory et al. [17] highlight organizational transformation and change invoked by IT programs as distinctive feature. Reason enough for us to first clarify the concept of an IT program for the purpose of our research. We do this by first introducing the more common concept of an IT project (Section 2.1). We then distinguish projects from programs in general (Section 2.2), before we finally clarify the particular concept of an IT program (Section 2.3).

2.1 IT Project Management

From a historical perspective, IT PM can be conceived as a variant of PM specifically attuned to IT products or IT-based solutions as project outcomes. The PM discipline emerged in the latter half of the 20th century in response to the need for organizing (engineering) work in a way that allows for creating a unique (technical) product effectively and efficiently [19]. The early development of the PM field of study had been driven by disciplines such as Engineering and Operations Research and was much concerned with the development of techniques for planning project work such as product and work breakdowns, bar charts, activity diagrams, resource allocation, scheduling or critical path calculation methods [20, 21]. Accordingly, the domain of PM is traditionally perceived as dealing with the application of tools and techniques (e.g. critical path method) for directing the use of diverse resources toward the accomplishment of a unique, complex outcome (a one-time task) within time, cost and quality constraints. This understanding of PM is also expressed in what has become widely known as the "Magic Triangle" of PM [22, 23]: Projects strive for producing a *specific outcome in a defined quality* within a given *cost* and *time* frame.

The development and diffusion of information and communication technology throughout the last decades has made PM pay dedicated attention to IT. Kwak and Anbari [20] estimate that over the last 30 years academic publications on IT projects and their management amount to a share of about ten percent of all publications on PM. Being rooted in

general PM, IT PM still shares its fundamental assumptions. As Atkinson [23] and Sauer and Reich [24] demonstrate, IT PM adopts the general idea of developing a defined outcome, in this case an IT-solution, under time, budget and quality constraints as expressed by the Magic Triangle. This assumption is still prevalent most contemporary textbooks on IT PM [25, 26, 27]. Some of these textbooks explicitly account for the variety of possible IT project outcomes including software products or modules, a packaged software solution customized to specific business needs, the migration of systems, the maintenance and adaptation of existing applications, the setting up of databases, server installations or systems software updates to be rolled out (e.g. [28]). The vast majority of textbooks, though, center on software applications and accordingly deal with software projects in particular (e.g. [25, 26, 27]). Therefore, we stick to the example of software projects to delineate the domain of IT PM from technical development tasks involved in IT projects. In the case of software projects, the latter are associated with the discipline of Software Engineering (SE) as opposed to PM. Hence, though going hand in hand, PM and SE are addressing fundamentally different tasks and challenges in IT projects [29]. The interaction and differences between IT PM and Software Engineering can be illustrated by comparing the respective phase models as depicted in Figure 1.

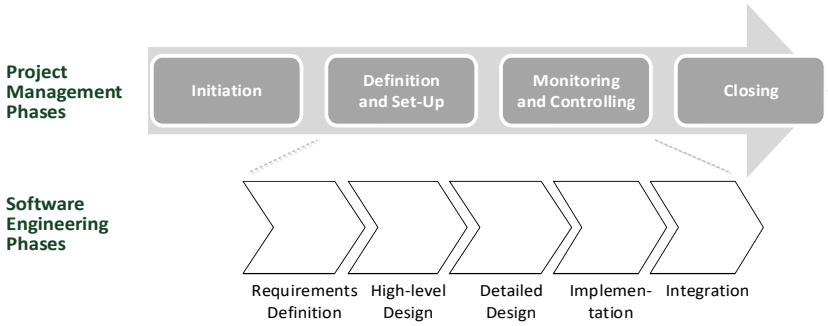

Figure 1. Software Engineering and Project Management

Software development activities are traditionally structured into phase models with phases often named “requirements definition”, “high-level software design”, “detailed software design”, “implementation and unit testing”, and “unit integration and system testing” (e.g. [27, 30]). The operational work in projects is to be carried out by (technical) personnel whose activities need to be coordinated and supervised. Management tasks include project planning, assigning work to project staff, organizing the project as well as leading the team and controlling work progress. In addition to coordinating internal work, management in many projects also includes the synchronization with external partners, the cooperation with users, the communication with stakeholders as well as managing quality and risk. As depicted in Figure 2, these management tasks are “superordinate” to the technical development activities included in the SE phase model. To illustrate the differences in the SE and IT PM tasks, Figure 1 uses a typical IT PM phase model [27] distinguishing four phases: “initiation”, “definition (or planning) and set-up”, “supervision and controlling”, and “closing”. The figure also visualizes that the IT PM phases span across and extend the SE phases. IT PM starts long before the first line of code is written and often even before the demands on the software solution are fully known. Additionally, PM does not end with the delivery of a piece of software as outcome but rather extends the process to the take-over of the deliverable by the project customer and, if necessary, its integration into the target environment [29].

The distinction of management tasks from technical tasks in IT projects is not only a conceptual one but also well supported by empirical research. In fact, studies did not find technical skills to be among the most important qualifications of successful IT project managers. Instead, managerial qualifications including leadership capability, verbal and written communication, scope management, listening, project planning, people skills, motivational skills, negotiation and organizational skills were the top ten qualifications [31, 32].

Our short sketch of PM is necessarily simplified and as such not capable of giving a full account of the latest efforts to address some of the restrictions pointed out [9]. However, such efforts clearly evidence an increasing awareness for the scope limitations of traditional IT PM and its constricted focus on cost, schedule, and functionality [24].

2.2 Program Management

Professional institutions such as the Project Management Institute (PMI), the Association for Project Management (APA), or the UK Office of Governance Commerce (OGC) have clearly realized the limitations of PM. As a response, these institutions have suggested Program Management to complement projects and Project Management. The concept of a program emerged in dealing with the limitations of the more common concept of a project [14]. Projects typically presuppose an outcome that is clearly defined in scope and quality so that PM can focus on accomplishing this outcome within the given resource and time constraints. Programs, in contrast, are perceived as "big" organizational undertakings involving a larger number of projects in support of common, superordinate business goals. More formally, programs can be defined as large-scale initiatives involving a set of interrelated projects and organizational measures that are intended to collectively realize a value. Lycett, Rassau, and Danson [33, p. 289] characterize programs as having a significant impact on the organization and sharing a common intention related to the corporate goals. The projects involved in a program are interdependent in their resources and, even more importantly, in that they share a common intention and contribute to achieving superordinate goals. Therefore, the full value of a program is only realized when the projects included are successfully implemented in combination. The superordinate business goals pursued are often strategic by nature [15]. Consequently, programs typically have a high impact on the entire organization or at least on large parts of it [33].

Program Management (PgM) refers to a set of management tasks and practices essential for successful program planning and execution. Ferns [34, p. 149], in an early definition, summarizes these activities as "the coordinate support, planning, prioritization and monitoring of projects to meet changing business needs". In a similar vein, Lycett, Rassau, and Danson [33, p. 289] define PgM activities as "the integration and management of a group of related projects with the intent of achieving benefits that would not be realized if they were managed independently". Gaddie [35] elaborates in more detail on the challenges involved in PgM as opposed to PM, which include the balancing of scope between projects, the resolution of project conflict, and the prioritization of project resources with respect to the achievement of a superordinate business goal or an overriding (strategic) purpose. Partington, Pellegrinelli, and Young [15, p. 87] specifically emphasize the strategic nature of PgM which they describe as dealing with the "structures and processes that are used to co-ordinate and direct multiple interrelated projects that together constitute an organization's strategy".

Table 1. Programs vs. Projects

Feature	Project Management	Program Management
Objective	Bring about an outcome of a specified quality within defined time, resource, and cost constraints	Achieve an overarching (strategic) goal by implementing a larger IT-initiative involving a set of related IT/IS projects
Scope	Single investment which is to be implemented	Multiple goal-interdependent investments implemented through projects and accompanying change measures
Duration	Finite, predefined start and end, several months to one year or more	Finite, often several years
Manager's role	Heads the project team and represents the project to its owners and, if applicable, to portfolio and program management	Supervises managers of the projects in the program, heads administrative staff supporting PgM (often organized in an PgM office), reports to top management
Success Measures	Narrowly defined in terms of scope of the project outcome, quality, time, and cost	Broadly defined in terms of benefits delivered to stakeholders or the achievement of an organization's (strategic) goals

Table 1 gives an overview of the distinguishing features of PgM as opposed to PM schematically. It is important to note that it is not sheer size that distinguishes programs from projects as sometimes assumed in the literature [34, 36]. For example, developing a complex software application for the public agencies and rolling it out to a dozen sites or more is surely challenging, but might still be best dealt with in a project setting. Some authors refer to such projects as "mega projects" to highlight specific risks and management challenges associated with such large projects [37]. PgM can also be clearly distinguished from Project Portfolio Management, which has its roots in the management of capital investments. Portfolio Management takes a relatively narrow investment perspective and pursues the ultimate goal of maximizing the risk-returns-ratio across the entirety of an organization's projects [38, 39]. Finally, with its orientation towards specific strategic goals and its association with organizational change, PgM can also be distinguished from multi-project management, which has an operational focus on resource allocations, scheduling and day-to-day co-ordination [40, 41].

2.3 IT Program Management

The "key rationale for organizing work into an IT program is that the intended organizational benefits cannot be achieved by pursuing individual IT projects on their own" [17, p. 58]. Hence, IT programs "typically encompass a coordinated set of interrelated IT projects" [17, p. 58], which is seen as being "structured to meet goals established by top management regarding the use of technology" [18, p. 80]. Table 2 reports the particularities that Gregory et al. [17] associate with IT transformation programs (also see [42]). As basic characteristics, they point out the importance of IT programs for achieving competitiveness in the current dynamic business environments and the role of information technology as a competitive lever and an enabler of change in this situation (Table 2, rows 1 and 2). The other two characteristics refer to the management of IT programs: The authors assume that IT PgM has to deal with high levels of complexity and to ensure IT-business collaboration (Table 2, rows 3 and 4).

Table 2. Characteristics of IT transformation Programs [17]

Characteristic	**Description**
Achieving IT-based competitiveness	IT transformation programs serve the specific purpose of increasing the IT-based competitiveness of a firm and are therefore often observed in competitive and dynamic business environments. Within such competitive and dynamic business contexts, a key mechanism for achieving IT-based competitiveness is building an IT platform that provides stable core operations and the necessary foundation for competing with IT.
Triggering IT-enabled change	IT transformation programs typically involve substantial change. A particular characteristic of IT transformation programs, as opposed to organizational transformation programs in general, is that this change is enabled or triggered by IT. Thus, in IT transformation programs, "IT" is considered a major asset for leveraging organizational transformation, and the changes made to organizational IT itself are considered important for leveraging business change.
Dealing with IT program complexity	Executing IT transformation programs involves the complexity associated with managing a set of highly interrelated IT projects and aligning individual contributions to the strategic objectives at the program level. IT program management can be conceptualized as an integral part of an IT transformation process, i.e., the design, development, and deployment of changes to IT and the organization.
Partnering between IT and business	Of the multiple ways in which IT functions may contribute to business inside an organization, a specific characteristic of IT transformation programs is that they require the IT organization to be an active partner with the business. The IT-business partnering perspective involves the need for IT and the business organization to be mutually accommodating and to adopt the mind-set that IT is an integral element to the business.

At the heart of an IT program is what Gregory et al. [17, p. 57] call an "IT platform". They use the term platform to demarcate IT programs clearly from IT projects with the latter having a piece of software or a single information system as object and outcome. The object of an IT program, in contrast, is what Ciborra [43] has described as the IT-based infrastructure of an organization. Such an infrastructure comprises all the prerequisites for technology-based organizational information and communication. These include hardware components such as computers or network

equipment as well as application systems and stocks of (digital) information to be processed and transmitted via IT [44, 45, 46]. As part of an infrastructure, these components do not provide value independently but only in relation to each other. In other words, application systems, computers, networks, and databases have to be integrated into a coherent whole to have the full value of an IT-based infrastructure materialize. This is what differentiates a single IT component or an arbitrary set of components from an IT-based infrastructure [47, 46, 43].

Given its *heterogeneity*, it is clear why changes to and developments of an IT-based infrastructure cannot easily be dealt with in IT projects alone. While projects focus on single IT components, programs have to assure the implementation of many different (infrastructure) components at the same time and in relation to each other. Implementing single components calls for setting up IT projects, e.g. software development projects, database projects, and hardware rollouts, in combination with training or organizational change measures. These projects – as the components they intend to deliver – are interrelated and thus in need of mutual coordination.

Another important characteristic of IT-based infrastructure is that it is a foundation for conducting business that permeates the organization and often transcends corporate boundaries, thus affecting large parts of the organization's business [48]. Hence, it is not a mere technical artefact, but always related to the organization it supports and the prevailing practices of use. In other terms, IT-based infrastructure is "*socially embedded*" [44, 45, 46]. As such, it cannot be changed or extended successfully without giving due consideration to the business context and use practices. Rather, making modifications to the IT-based infrastructure requires organizational adaptations and often triggers organizational change.

A third important characteristic of an IT-based infrastructure is that it is virtually impossible to build it from scratch. In contrast, such an infrastructure evolves over time in an organizational context. Consequently, any attempt to change an IT-based infrastructure needs to take account of an "*installed base*" as the status quo to be further developed [44, 45, 46]. This challenge is not well addressed by IT PM that has been criticized for following a "start from scratch" approach. As such, it has either "ignored the influential role of pre-existing information systems" and infrastructure [9, p. 3] or at best has dealt with it as a constraint.

Given the heterogeneity of IT-based infrastructures, their embeddedness into the organization, and their evolution over time, we subscribe to the view of Gregory et al. [1] who associate IT programs with levels of complexity that are much higher than those for IT projects. In particular, given the embeddedness of IT-based infrastructures into the business organization, IT programs have to deal with organizational change on a level that is far beyond the levels of participation acknowledged in the IT PM literature. This change, in turn, calls for a strong partnering of IT and business as argued by Gregory et al. [1]. Finally, as endeavors in both technical and organizational change, IT programs have to deal with high levels of uncertainty. IT projects, in contrast, premise well-defined objectives, a tightly defined (tangible) outcome, and clear-cut conditions (e.g. resource and time restrictions as laid out in a project brief).

3. Research Approach

Our study on challenges in IT program management includes five case studies from organizations that ran into trouble with their programs. The following sub-sections introduce our focus in studying PgM challenges as well as the case studies and the method for data collection (for a detailed documentation see [49, 50]).

3.1 Research Focus

Large change initiatives require attention by top management and much control and decision making by senior executives. The strategic role and transformational character of IT programs emphasize IT PgM as an executive function. Consequently, we define management in a focused sense of "to lead, to direct" rather than in the colloquial definition of "to handle skillfully" or "to work upon for a purpose". Management in this definition includes (only those) activities that executives engage in as they direct organizational matters in order to achieve organizational goals. The colloquial definition, in contrast, is unspecific in that it denies the difference between such management tasks on the

one hand and technical development and administrative tasks on the one hand. Our focused understanding of IT PgM hence parallels in some respect the demarcation of IT PM from the more technical discipline of Software Engineering introduced above (Figure 1).

Our definition of PgM also ties our research to Management Studies that informed us with the "classical" POLC structure for differentiating management activities in a narrow sense from the vast set of activities associated with an inclusive definition of management. The POLC structure, which distinguishes management functions into planning, organizing, leading, and controlling activities, can be traced back to Henry Fayol's seminal work on management studies [51]. According to the verdict of Wren and Bedeian [51, p. 415] the POLC structure has stood the test of time in the history of management thought, so that recent work has rather complemented as opposed to replaced it. The relevance of the classification and its clarity and feel led us to adopt it in our research.

3.2 Case Studies

Given that IT PgM is an under-researched field, we pursued an exploratory approach, which is particularly suitable when a researcher wants to explore areas about which he has little or no knowledge [52]. Our exploratory research builds on case studies with data collected by means of document analysis and semi-structured interviews. However, as a single case study always focuses on a particular setting at hand, results are difficult to generalize. One way to address this difficulty is to include more than one case study into research. As Yin [52] suggests, multiple cases enable comparisons to clarify whether an emergent finding is simply idiosyncratic to a single case or consistently replicated in several cases. Comparing different cases can help to generalize results by looking for common or shared experience and controlling for idiosyncrasies. Yin [52, p. 41] calls this kind of reasoning "analytical generalization" as opposed to "statistical generalization", which is used in large-scale quantitative studies.

Table 3. Overview of the Cases

Code	Program motivation, aims, and duration	Role of IT in the program
TLC	Reduce costs and improve time to market by replacing idiosyncratic and ill-documented legacy applications and interfaces. *- 2 ½ years -*	Integration of reporting applications, consolidation, and functional extension of accounting and reporting systems.
TEC	Consolidate financial reporting after merger; fulfill compliance requirements for going public. *- 2 years -*	Integration and standardization of IT-based infrastructure, introduction of standard software for core operations.
LIT	Spin-off of a technology division as an independent subsidiary in preparation of going public. *- 1 ½ year -*	Set-up of an IT-based infrastructure for the new subsidiary including network hardware, applications, and data resources.
SUP	Merging the IT-based infrastructures of two newly acquired businesses in a way that allows for organizationally integrating them into the group. *- 3 years -*	Integration and standardization of IT-based infrastructures while keeping operations alive.
AUT	Set up of an IT-based infrastructure for a new offshore production plant. *- 3 years -*	Set-up of a completely new IT-based infrastructure including network, application systems, and data resources.

For our multiple case study research, we had access to detailed information on six programs, all having the development of IT-based infrastructures at their heart. All programs were also coordinated hierarchically, as assumed in the program management literature [33, 36]. The organizations carrying out the programs are headquartered in Germany, but do business on an international scale. We excluded one program where IT did not play as significant a role as we assumed in our definition of an IT program. This left us with a sample of five cases to analyze and compare. Table 3 provides a

summary of the cases (due to confidentiality requirements we cannot provide detailed information on the organizations involved and their resource inputs here). Cases TLC and TEC were from the information and communication technology industry, cases SUP and AUT from the manufacturing industry, and case LIT from the consumer electronics industry. The choice of our five cases followed a "replication logic" [52, p. 57] in that the case situations are looked upon as being similar in the way they exhibit conformable challenges. The fifth case (AUT), however, differed from the first four in that it was more technologically challenging. The program did not change established organizational practices but was concerned with setting up an infrastructure for a new organizational unit. As such, it is not an IT-based change program in a strict sense. Consequently, we used the AUT case rather for comparing it with the other four programs, following the idea of "theoretical replication" in multiple case study research [52, p. 57].

In the first case, the large telecommunications company "TLC" saw the need to technically consolidate and standardize its infrastructure. Hence, the company initiated the program to revamp the heterogeneous, complex, and largely proprietary network and hardware infrastructure. In the second case, the telecommunications company "TEC", which had undergone a merger just prior to our research, aimed to consolidate its more than 50 reporting systems into one integrated solution. The third company "LIT" was a business unit carved out of a large technology corporation. The program aimed at setting up an IT-based infrastructure for the new subsidiary that was expected to provide the IT services required for business operations from day one, and to facilitate reporting for going public. The fourth organization, the automotive supplier "SUP", had recently acquired two smaller, specialized supplier companies. SUP subsequently initiated a post-merger integration program in which the integration of the IT-based infrastructures played a major role in realizing synergy. In the fifth case, AUT extended its production facilities by building a new plant in China. The program was set up to realize the infrastructure required for plant operations.

3.3 Data Collection and Analysis

We received access to the case data via a management consultancy. In the first two cases, the consultancy had sole auditing mandates. In the latter three cases, the consultancy had auditing mandates and, on top of this, assignments to bring dedicated PgM competence into the running programs. In all five cases, we had access to the complete documentation of the PgM audits conducted as well as to the program brief, the documentation of the program organization and management, as well as to reports on the progress over time. Moreover, in the latter three cases, we also had access to presentations including information on the running programs, problems, and management issues that arose. In addition to studying these documents, we had the opportunity to discuss and verify findings from our document analysis in interviews with one experienced consultant in each case (senior consultant level or higher), who was actively involved and had an intimate knowledge of the program. The interviews also provided us with the opportunity to collect additional information on the cases from the experience our interviewees made with the programs. For this purpose, we conducted the interviews in a narrative manner using a semi-structured interview guideline (see Appendix). The interviews allowed us to verify and complete our understanding of the program issues encountered in the analysis of audit reports and program documents. On top, we received a detailed account of the problems and management issues that our interviewees identified in the assessment of the programs and, in three cases, in their active involvement in managing the program later on. As concerns the measures taken for resolving the issues, we clearly distinguished between the consultancy proposals and the measures approved by the organizations undertaking the programs.

For documentation, the interviewers took notes and summarized the interviews in written protocols right after having conducted them. Afterwards, two different researchers analyzed the protocols independently by highlighting the issues raised, identifying problem causes, and relating issues to measures proposed or taken. We finally summarized the results of our interviews against the background of the program information gained from the document analysis in "case vignettes" of about 10 pages per case.

After analyzing the cases individually, we also compared the results of our analysis across cases in order to identify issues that were somehow "typical" for such programs [49, 42]. From this analysis, we compiled a list that we finally validated in expert interviews. We chose interviewees who had acquired profound knowledge about reoccurring

management issues in IT programs over many years as well as experience in what measures tend to be effective in dealing with these issues. Hence, we could justifiably looked upon them as experts in the field. Three of them were practice leaders from the partner consultancy that already gave us access to the cases, but of course distinct from our interviewees in the case studies. A fourth expert interviewed was also an IT management consultant, yet from another consultancy. The fifth one was the business head of a large IT program in an international logistics company. We structured the expert interviews along the phases of the program management life cycle to facilitate the interviews by giving them an easy to follow logical order and practical orientation.

4. Challenges and Recommendations for Managing IT Programs

In this section, we present core findings from our case studies. To present these findings in an "actionable" way, we again use the program management life cycle as an organizing framework. While designations may differ, the four stages "Identification", "Set-Up", "Execution", and "Closing" are generic to most life cycle models [33] including those proposed by the OGC [10] and the PMI [11]. In the following subsections, we present critical management issues and challenges in the first three phases of the PgM lifecycle. We exclude the closing phase in the following, because the data we collected on what happened after program execution, e.g. evaluation of program success, release and reintegration of program and project staff, or documenting lessons learnt, were only limited.

In the next three subsections, we briefly introduce the first three PgM stages. For each of the stages, we then report on typical issues that managers need to pay heed to in order to avoid severe difficulties and problems we observed in the studied programs. For further insight into our findings, we refer the reader to [50, 49, 42].

4.1 Program Identification

As big moves, programs make high demands on resources that need to be justified by the benefits. Accordingly, it is important to weigh up the motivation and intended benefits of the program against the resource requirements and risks. The identification stage deals with the clarification of the purpose and objectives of a program with regard to the organization's mission, goals and strategies. Justifications for establishing a program include fundamental change pressures to be addressed or significant business level benefits to be achieved by the program. However, repudiating the idea of establishing a program is also a possible outcome of the identification stage.

Formulate and promote a compelling vision for the program

To achieve visibility, awareness, and support, a clear idea of why to conduct a program and what to achieve is important. A clean-cut and compelling vision statement is instrumental for this. The SUP case, for example, suffered from a vision that hinted only vaguely towards a long-term organizational future and failed to give a clear idea of the program's intended business benefits and value. In the cases of TEC and AUT, the program vision was poorly communicated to the larger organization and thus largely unknown outside the program. In effect, these programs experienced a lack of awareness for their importance, arbitrary stakeholder expectations, and limited support by the business.

A tangible vision can also help to keep the motivation alive and maintain speed and sense of purpose. This is of vital importance for programs. As long-term endeavors, they deliver business benefits only with a significant time lag so that they are at risk of experiencing strain and fatigue during execution.

Analyze and clarify the scope of the program in terms of reach and range

IT programs typically reach beyond technology (or say the IT unit) in that they bring about organizational change to the business. Accordingly, it is essential to clarify the business scope of the program (which units or sites are affected?) and the scale of change to be brought about (e.g. supporting the current organization vs. transforming it).

The program in the case of TEC affected different sites in several countries, but PgM did not pay enough attention to the different cultural backgrounds and specific local needs. The AUT program, in particular, neglected the specific

economic and cultural situation in China. Both programs were looked upon as "rollouts" of a "given" infrastructure solution rather than endeavors of IT-based change in specific organizational and cultural environments. This turned out to be mistaken, so that both programs had to make strong provisions for adapting their solution to local needs and national peculiarities later on. PgM in the TEC case, for example, established a standing committee with multinational representatives from the different sites during program execution.

Define the business benefits to be achieved and relate them to stakeholder interest

While the deliverance of the targeted IT-based infrastructure is a necessary prerequisite for program success, a well-functioning infrastructure solution does not guarantee business value per se. Rather, it is the (beneficial) effects that the IT-based infrastructure has on work practices in the business organization that ultimately bring about the intended business value. Hence, it is important to state the intended business benefits from early on and to define how their achievement is to be measured. The business value of an IT program also strongly depends on whether the business welcomes the organizational changes and adaptations necessitated by the new infrastructure or not. Hence, addressing the interests of the business stakeholders and finding support in the business organization is equally important for IT program success. A good way for achieving this is by demonstrating from the outset how a program benefits the different stakeholder groups and how it adds value to the business.

The programs in the SUP and AUT cases were promoted without paying due attention to the specific interests of different stakeholder groups. This resulted in excessive and misled stakeholder expectations that the programs could not live up to. The program in the SUP case, as a result, had to invest extensively in the management of stakeholder expectations during program execution including target group specific communication. In the case of AUT, good personal relationships between program representatives and line executives partly helped to align expectations later on.

Ensure support by key stakeholders and senior executives

Even when the diverse stakeholder groups affected by a program clearly understand the benefits, their interests and expectations can be so diverse that conflicts arise which cannot be mutually resolved. Implementing IT programs across the organization, hence, requires additional top management support beyond that of the CIO. Only with this support, it is possible to resolve conflicts between stakeholders and to overcome resistance. A clear definition of strategic benefits can be instrumental in obtaining the management support required.

The LIT program might serve as a case in point, since it brought about organizational change to a degree that put the formal positions and the authority of line executives in the business organization into question. As our interviewee explained, "Many stakeholders involved (…) were placed high in the business hierarchy. This resulted in major political problems when it came to planning and implementing changes in the future line organization". The resistance provoked by the program could be resolved only in exhausting political proceedings and with strong top-management involvement.

Identify the technological expertise required and look for adequate external partners on the market

IT programs build on particular technologies and related expertise that is rarely (fully) available in-house. In fact, none of the organizations in our study possessed the complete technological expertise required to make decisions on all aspects of the IT-based infrastructure or to oversee solution development completely.

Given the dependency of IT programs on contributions from external experts, the responsible managers paid little attention to selecting suitable service providers and consultancies as partners at the outset of the program. In the TLC and TEC cases, this omission resulted in significant technical drawbacks and failures during execution due to missing expertise, differing perceptions of responsibility, and mutual recriminations between providers.

Assess internal program management competencies, support, and training needs

In the IT programs we studied, many PgM responsibilities were assigned to line executives that did not possess dedicated PgM skills and experience. Key positions were staffed with IT experts who had considerable technological

knowledge but often lacked a strong leadership profile. The lack of PgM skills became particularly apparent in the LIT and AUT cases that finally commissioned an external consultancy to provide PgM training and coaching on the job as well as support and guidance to the internal IT executives.

4.2 Setting up the program

The program identification phase prepares the decision on whether to embark on an IT program or not. This decision is based on the questions of (I) whether there is (the need to conduct) an IT program at all in terms of strategic value to be achieved and change to be brought about and (II) whether the organization is capable of running the program. If the decision is affirmative, the program can be set up formally. Loosely speaking, the set-up phase is concerned with developing high-level plans on how to execute the program. This includes refining the vision and defining the program organization, chartering the projects involved, clarifying project interdependencies, and sequencing projects as well as accompanying organizational change measures.

Substantiate the program vision with an infrastructure blueprint

A tangible program vision can help to maintain speed and a sense of purpose during program execution as already mentioned (section 4.1). In addition, a clear-cut and concrete vision can contribute to a common understanding of the targeted outcomes and of the interplay of the program deliverables.

The vision in the SUP case was too vague to provide orientation and guidance. The other programs, which started with a clearer vision, performed better and had less difficulty to find acceptance for the changes brought about. However, we found that simple vision statements, while providing some sense of purpose, do not automatically provide a common understanding of the IT-based infrastructure to be developed through the program. Additional blueprints, called “target architectures” (TLC) or “target operating models” (TEC) in our cases, can help underpin the vision in terms of the outcomes to be achieved. Such blueprints can also be instrumental in building a common understanding across different stakeholder groups, business departments, units, or sites as concerns what the program is about.

Define major building blocks

Architectural blueprints can also serve as a common reference point for the different parties involved in program execution later on. By highlighting major building blocks of the targeted infrastructure, they can help identify critical deliverables and define projects for developing these deliverables. Moreover, such blueprints facilitate the co-ordination of different projects and the integration of their outcomes into a common infrastructure solution.

PgM in the TLC case defined project assignments and deliverables in broad strokes only so that managers had difficulties in identifying aberrations and in taking timely corrective actions later on. The same program also suffered from third parties working to formal contract only, without being strongly committed to the program objectives, so that they had little interest in committing themselves to building the overall infrastructure solution. We observed a similar situation in the TEC and AUT cases. A clearly defined target architecture could have helped in clarifying the contributions expected from the external partners and in aligning them with those of other external and internal projects.

Devise project plans in an integrated manner and define common planning and reporting standards

An overall program plan is a kind of master plan that gives an overview of the major program positions. These include internal projects, external projects and deliveries, as well as accompanying organizational change measures. As a master plan, the program plan is necessarily aggregated and somewhat abstract. Hence, it is important to relate it to the more detailed project plans, which provide insight into the deliverables, resource requirements, cost estimates, time scales and risks associated with establishing the program positions.

In most of the cases that we studied, we could observe a lack of integration of the program plan with the lower level plans. In the TLC, TEC, and AUT cases, this lack resulted in misguided top-level estimates of cost and effort. In addition, managers in the TLC case had to struggle with duplicate planning efforts, unaligned plans, and unrealistic

project schedules, because the different parties involved in the program built their plans on divergent premises. The problems in all three cases were specifically severe with respect to external providers that used proprietary planning and reporting standards and management tools. Introducing common program and project management tools turned out to be an effective measure to foster better integration of program planning and reporting (TLC).

Organize the program in detail and involve internal actors in key roles

All the programs that we studied suffered more or less from a poorly defined program organization. The organizational plans did not go much beyond rough structure charts printed on slides. Roles and responsibilities lacked clear definitions. When assigning roles to internal managers, it is furthermore important that these have enough capacity and the necessary PgM competencies. In the TEC, LIT, and AUT cases, PgM responsibility was assigned to IT mangers on top of their responsibilities in the line organization. The TEC case where the CIO was expected to take over the program lead may serve as a case in point. The CIO and other IT executives in the TEC case were heavily overstrained with their PgM duties so that they ignored them to an extent to which the program was perceived as devoid of any leadership.

Moreover, we found that assigning key PgM roles to external parties resulted in a loss of oversight and control over the program. In the TLC case, for example, the responsibility for change management was completely laid into the hands of an external consultancy that had only a limited understanding of TLC's business. Consultants also dominated the program management office, which was set up to support program management and controlling. This resulted in the internal program managers having only indirect access to and insight into the program and its progress. Moreover, the consultants saw themselves more in an administrative role. They neglected an active progress monitoring and program controlling. Unlike this negative example, the involvement of external professionals also turned out be helpful in bringing in PgM competence or in assuming unpopular roles in monitoring program progress or evaluating critical deliverables ("bad guy") in our programs.

Establish program-wide management standards

While well-defined program roles and responsibilities are fundamental for a good program organization, there is more to it than that. In addition, common process and working standards are important to facilitate program execution. Programs involve diverse parties and are distributed across different projects. Hence, common planning and reporting procedures (TLC, TEC, LIT, SUP), unified methods for quality and risk management across all program levels (TLC, TEC, LIT), and defined escalation procedures (TLC, TEC) are important for managing them in an integrative manner. Clear rules for conducting meetings and for writing minutes can also improve PgM effectiveness (TLC, LIT, AUT).

Design contractual and relational mechanisms for governing external partners

IT programs are typically very dependent on expertise from third parties. This, in turn, calls for an informed selection of external partners and for carefully designing the mechanisms that govern co-operation. These include modes of co-operation, reporting procedures and co-operative learning mechanisms. Contracts as governance mechanisms should define the contribution of the external actors as precisely as possible to clarify expectations. Beyond specifying every partner's individual contribution to the program, it is also advisable to include shared incentives for the achievement of the overall program success.

Managing external partners was a major challenge in all programs we studied. In the LIT and TLC cases, the PgM executives had even been completely unprepared for dealing with this challenge. They had neither much experience in selecting and contracting external suppliers nor in supervising procurement processes. To counter these deficits, an external consultancy trained them in conducting tender exercises effectively and supported them in contracting suppliers and partners as well as in supervising contract fulfillment and co-operation.

4.3 Program execution

The execution stage is concerned with supervising the implementation of the program. During this stage, the project managers run the individual projects involved, and PgM takes responsibility for monitoring progress, assuring and promoting benefits delivery, assessing risks, representing the program to stakeholders, and aligning it with the target business environment. The execution of a successful program ends with the delivery of the targeted infrastructure and the achievement of the intended (strategic) business benefits.

Deal with scope changes actively and explicitly

Programs always have to adapt to changing demands and conditions. This is even more the case in IT programs since these have to deal with ongoing technological changes and with changing business needs in parallel. However, scope changes might affect program delivery, so that it is critical to document them and have effects on program duration and cost approved.

The cases TLC, SUP, and AUT all had to deal with significant scope changes. The programs started with a business demand that was only defined in broad strokes and hence needed refinement later. The requirements formulated by business representatives during program execution were rather ad-hoc, turned out to be unreliable, and changed over time. In response, measures and standards for defining and approving requirements had to be introduced during execution. These included the installation of a dedicated authority for verifying and approving business requirements as well as the introduction of formal "end-to-end" processes (TLC, SUP) covering all steps from requirements formulation through verification and agreement to fulfillment.

Co-ordinate program activities across work streams

A specific challenge in IT programs is to manage the complex interrelationships between technical projects (e. g. building up a computer network, installing servers, developing software) and more business-oriented projects and organizational change measures. In the cases SUP, TLC, and LIT, the different projects were organized in specialized "work streams", e.g. for building the technical infrastructure, for developing software applications, for changing organizational practices and for dealing with legal and compliance issues. Defining such work streams allows for bundling specific (technical, organizational or legal) competencies. This advantage, however, can be offset by silo thinking within the work streams and by the tendency to act independently of each other. In the LIT case, PgM introduced dedicated mechanisms for coordinating projects and activities across different work streams including regular meetings for work stream leads.

Monitor project delivery closely and approve deliverables formally

Strong leadership requires the conclusion of agreements on what is to be achieved by the projects involved in a program and making clear what good project performance looks like. This in turn calls for tightly monitoring the performance of internal project managers as well as external service providers and suppliers. The project managers in the TLC and AUT programs tended to keep project problems under wraps, which resulted in major delays. TLC also struggled heavily with outsourced projects. These remained black boxes to TLC, so that technical shortcomings did not become visible until completion. Monitoring external partners turned out to be even more challenging, since these tended to narrowly focus on their projects without having a strong interest in the infrastructure solution and the program's success in general. Hence, it was difficult to solve technical deficiencies and incompatibilities due to mutual recriminations between the providers.

From these experiences, we conclude the need to define project deliverables clearly, and evaluate delivery regularly and diligently. This can be done, for example, by having deliverables pass quality gates before approval (LIT, AUT). Given that PgM lacks the technical competencies to do so, it is also possible to assign mandates for the evaluation of key deliverables to external experts as it happened in the cases TLC and LIT.

Keep program on speed

As long-term endeavors, strain and fatigue imperil IT programs. Hence, in the absence of incentives and performance regimes, there is the danger that those charged with program tasks lose their motivation, neglect their duties, or even resign their program roles. A tangible vision can help in keeping a sense of purpose, but we found that continuous monitoring combined with strong performance incentives is required to keep a program on speed on the long run. Incentives may include career opportunities for internal project managers (SUP) as well as success bonuses for external providers (TLC, TEC, AUT). These bonuses, however, should not only narrowly relate to project deliverables but also to their larger contribution to overall program success.

Be aware of and explicitly address cultural differences

A major challenge across all programs we studied was to deal with different organizational cultures. The most fundamental barriers we identified related to the communication between IT representatives and business representatives. These became especially apparent in the requirements definition processes that were characterized by vagueness and misunderstanding (TLC, SUP, AUT). We observed particular problems in the TLC, LIT and SUP programs, which organized IT-related activities into separate work streams.

On top of communication barriers between IT and business, four of the IT programs we studied involved organizations or sites in different countries (TLC, TEC, SUP, AUT). However, PgM did not pay sufficient attention to national differences and cultural peculiarities in the initiation and set-up stage, so that additional adaptation effort was required during program execution. Outsourcing and offshoring of IT brought additional diversity to the spectrum of national and organizational cultures in a program. In the TLC case, for example, the Chinese provider had a service mentality that lead him accept any requirement from TLC without questioning it. The provider also accepted requirements that he did not understand or was even able to fulfill at all.

Promulgate program progress and report benefits on a regular basis

The success of an IT program does not only depend on the successful development of an IT-based infrastructure alone, but equally on the business organization and whether it accepts and welcomes the change brought about by the program or not. In the programs we studied, however, the business often lost interest in the program over time due to its long duration and the time lag until benefits showed up. In the face of problems and delays as well as high costs incurred in the programs, a sense of achievement even gave way to a perception of non-performance. This happened in the TLC and TEC case that failed to keep close contact to the business organization as well as in the SUP case that dealt with stakeholders on an ad-hoc basis only. As a result, the business organizations did not feel a sense of ownership and were largely unprepared to take over the program results later on. In the LIT program, we observed fewer problems in this respect due to a more regular communication with stakeholders and the business organization.

5. Summary

In our research, we set out to provide a fresh and unbiased look at the challenges that managers of IT programs face. Our multiple case study allowed us to uncover a set of common management issues and provided us with some insight into measures that can help address them effectively. We presented our findings in an actionable way following the stages of the PgM life cycle. Table 4 summarizes our findings in tabular form.

Table 4. Recommendations for Managing IT Programs

Recommendation	***Explanation and justification***
Identification phase	
Formulate and promote a compelling vision for the program	The program vision should provide a clear picture of what the program is to achieve and why. If such a vision is missing, programs are in danger of weak support, dissipating efforts, and of experiencing fatigue over time.

Recommendation	***Explanation and justification***
Identification phase	
Analyze and clarify the scope of the program in terms of reach and range	IT programs bring technology-driven organizational change to the business. Hence, it is essential to clarify in advance the business functions, units, and sites affected (scope) as well as the extent of organizational change and transformation expected (scale).
Define the business benefits to achieve and relate them to stakeholder interests	IT programs provide an IT-based infrastructure to support and connect large parts of the business, hence affecting multiple stakeholder groups. In order to avoid resistance and prepare the different groups for the change, it is vital that these groups see (their) benefits in the program. A benefits plan can be instrumental in achieving this.
Ensure support by senior executives and key stakeholders	Showing program benefits to stakeholders is important for receiving their support. However, stakeholder interests are not always homogenous so that conflicts may arise which cannot be mutually resolved. Strong top management backing and support is important for resolving and conflicts and overcoming resistance to change.
Identify technological gaps and check for market availability of the requisite technologies and expertise	The realization of IT programs requires particular technologies and competencies, which are seldom (fully) available in-house. Accordingly, before selecting technology vendors, IT service providers, or IT consultants for a program, organizations should diligently evaluate their ability to bring in the required know-how to the program.
Assess internal program management competencies, provide support and training	Executing PgM positions requires dedicated skills and experiences that are not necessarily available in the standard line organization. More specifically, they reach beyond technology and the expertise of many IT professionals. Hence, training and support are essential to prepare and enable internal managers for taking over PgM roles.
Set-Up phase	
Substantiate the program vision with an infrastructure blueprint	At the heart of any program vision is the IT-based infrastructure to be developed. Documenting this infrastructure in a "blueprint" or "target architectures" helps to make the intended outcome more tangible. Architecture blueprints also help in identifying and demarcating major building blocks and documenting interrelations between them.
Devise project plans in an integrated manner	The building blocks depicted in an architecture blueprint are also a good starting point for project and program planning. They help in identifying and defining the projects necessary to implement the major deliverables, in relating them to each other, and orchestrating them towards the development of the overall infrastructure.
Organize the program in detail and involve internal actors in key roles	A detailed program organization involves defining PgM roles with clearly assigned tasks and responsibilities. Without such role definitions, it is virtually impossible to fill them appropriately with internal staff. Delegating critical roles to external experts is not a viable option, even in cases where internal PgM competencies are limited.
Establish program-wide management standards	Clear role definitions are the foundation of any good program organization. In addition, PgM should lay down common planning and reporting procedures as well as standards for quality and risk management. Such standards later on facilitate the supervision of the program and the coordination of the projects involved.
Design contracts and relational mechanisms for governing external partners	Selecting external technology vendors, IT service providers, and IT consultants is one thing, building an effective partnership with them another. While it is important to design contracts diligently and to verify contract fulfillment, common incentives and additional relational mechanisms can further the reliability and quality of contributions from external partners.
Execution phase	
Manage scope changes actively	IT programs have to deal with ongoing changes in business demand as well as with technological changes and unexpectedly occurring technical problems. Such events can easily affect program delivery. Hence, it is important to formally document them and have their effects on the program duration and costs approved by sponsors and stakeholders affected.

Recommendation	*Explanation and justification*
Identification phase	
Co-ordinate program activities across work streams	To reduce complexity, IT program activities are often organized in work streams, which follow different perspectives on the change to be brought about. Examples are technical development, organizational change, staff training, or legal matters. The activities in different work streams are, however, factually interdependent and in need of close coordination.
Bridge cultural differences	Given their wide organizational reach, IT programs typically affect diverse organizational units, sites, and countries. Particularities of IT professional ethics and a multitude of external partners exacerbate cultural diversity. Hence, PgM should involve high cultural awareness. In addition, many programs necessitate mechanisms for avoiding and overcoming departmental thinking.
Monitor delivery closely	A central challenge in IT program lies in the integration and orchestration of a multitude of partial contributions from internal projects and external providers into a coherent whole. Close monitoring and diligent quality control are essential for seamlessly integrating diverse deliverables and synchronizing their provision across the program.
Keep program on speed	A compelling program vision is a good starting point for creating an initial program motivation. However, in the absence of strong incentives and continuing motivation efforts, programs as long-term endeavors inevitably suffer from strain and fatigue over time. Incentives may include financial ones as well as career opportunities for project managers and program staff.
Promulgate progress	Given the high costs incurred in IT programs and the time lag for benefits to show up, it is not surprising when a sense of achievement gets lost over time. In face of problems and delays, programs are easily perceived as non-performing. Accordingly, it is essential to highlight and communicate achievements actively to both, internal staff as well as sponsors and stakeholders.

The recommendations we give are still tentative and do not assume completeness. We clearly see empirical limitations. First, our focus on IT programs that ran into difficulties is specific. We could have equally studied IT program success stories, if we had access to comparable data. Second, we cannot exclude that our indirect access to the field via a management consultancy has biased our findings in some respect. Third, there is still some residual heterogeneity in the program settings, though we had selected our sample diligently with respect to the "replication logic" we applied in our analysis. Irrespective of these limitations, we found some support for the validity of our findings. A first set of five expert interviews affirmed our belief of having been able to identify important challenges that are at least of more than singular relevance to IT program managers.

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Appendix. Interview Guideline

We conducted narrative interviews with the help of the semi-structured guideline displayed below. As concerns the assessment of management issues in the programs (fourth topic area in our interview guideline) we structured our interview along the auditing dimensions applied by the consultancy to assess programs and to improve program management practice. These dimensions are “Leadership and Vision”, “Organization and Governance”, “Planning and Scope”, “Financial Management”, “Stakeholder and Dependency Management”, “Change Management”, “Human Resource Management”, “Quality Management”, and “Risk Management”. We stuck to these dimensions for the purpose of data collection and interview transliteration (for the case vignettes see [50]). However, to be clear, we did not use this structure for our analysis. The reason for structuring the interviews this way was that the auditing dimensions reflected the consulting practice of our interviewees and thus facilitated the interviews.

Topic Area	Content
Initiation of the interview	▪ Introduction of interviewer and interviewee ▪ Explanation of the research (context, goals, approach) ▪ Expectations, goals, and structure of the interview
Interview partner and her/his experience	▪ Department and position in the company ▪ Experience in the area of PgM, in particular related to managing IT programs
Information about the program and the consulting mandate	▪ Duration of the program, team size and structure, role of the interviewee within the consulting mandate ▪ Customer organization (industry, employees, revenue) and its business situation (market situation, strategy, business challenges) ▪ Program description (duration, goals, structure, measures, technologies) ▪ Focused mission statement: What were the core problems to be addressed by the program and/or the (strategic) business goals to be achieved? ▪ Approach taken to resolve the customer’s problem (methods, approach)
Issues and challenges in managing the program	For each of the nine audit dimensions … ▪ What does good management look like in the light of this dimension? How important is good management in this dimension for achieving program success? ▪ Which of the management issues and challenges did you experience as most pressing with regard to this dimension? Give examples!

Topic Area	Content
Measures recommended, endorsed, or implemented to improve the program situation	▪ Measures and actions to address the challenge(s) in the program implemented or considered for implementation ▪ Success of the measure in the eyes of the customer (approved? applied? effective?) ▪ Interviewee's ex post evaluation of the measures or actions ▪ Are there important challenges and difficulties in managing programs that are beyond the scope or the dimensions we just discussed?
Measures recommended, endorsed, or implemented to improve the program situation	▪ Measures and actions to address the challenge(s) in the program implemented or considered for implementation ▪ Success of the measure in the eyes of the customer (approved? applied? effective?) ▪ Interviewee's ex post evaluation of the measures or actions
Open ending	▪ Are there further important challenges and difficulties in managing programs that have not been touched upon so far? (beyond the scope of the dimensions)

Biographical notes

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