Not at all Ambidextrous

Industrialized Business/IT Transformation at UPM

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Completed Research Paper

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Abstract

Despite the undoubted importance of IT-enabled transformations for sustaining firm competitiveness, we are only at the beginning of understanding the conflicts and resolution strategies in IT transformation program planning and execution. Given the well-known global versus local tensions, practitioners might be tempted to balance the different extremes by remaining 'ambidextrous' throughout these multi-year initiatives. The case of the transformation of manufacturing processes at UPM demonstrates vividly that this is not always advisable: After an initial ambidextrous approach had failed painfully, UPM took an 'industrialized' strategy guided by five principles described in this paper. While UPM applied different balancing mechanisms on the program execution level, the industrialized principles demanded extreme resolution strategies on the planning level to manage the turnaround and achieve the desired benefits. Besides providing insights on each principle's key mechanisms, UPM's learnings emphasize the important, but undertheorized fit to business strategy in leading IT-enabled change.

Keywords: IT-enabled business transformation, Strategic ambidexterity, Program management, Industrialized principles, Manufacturing industry, Case study

Introduction

IT-enabled business transformation programs have been widely recognized as a key vehicle to implement corporate strategies and adapt firms to changing market conditions (e.g., Markus and Benjamin 1997). The potential scales of impact of IT transformation programs run the gamut from local optimization to global business scope redefinition (Venkatraman 1994). Program management in this context refers to the activity of managing several related projects that have a common transformation goal (see, e.g., Fonstad and Robertson 2006; Ribbers and Schoo 2002). Analogous to the alignment between a firm's strategic positioning and its IT strategy (e.g., Miles et al. 1978; Sabherwal and Chan 2001), IT-enabled transformations can aim at achieving different strategic goals of the company, such as exploring innovative opportunities in thriving markets, exploiting global scale in maturing industries, or achieving both of these goals simultaneously (cp. Birkinshaw and Gibson 2004). Depending on transformation scope and strategic goals, firms therefore need to resolve strategic and operational tensions on planning and execution levels (see Table 1), in particular well-known conflicts between global standardization versus local differentiation (e.g., Lawrence and Lorsch 1967; Ross 2006; Weill 2004).

Table 1. Current Theory of Ambidextrous IT Transformation (adapted from Gregory et al. 2015)

Level	Dimensions of tensions	Extremes to balance	Suggested resolution strategies	Key references
Transfor-mation planning	Business process change	Standardization vs. differentiation	Transformations need to achieve both global business process harmonization and flexible adaptation to local business process needs	(Gregory et al. 2015; Lawrence and Lorsch 1967; Ross 2006)
	IT architecture change	Replacement vs. integration	Transformations need to focus on both, fundamental renewal of IT and keeping and integrating legacy systems	(Gregory et al. 2015; Ross 2006)
	Ownership of change	Business vs. IT driven	Transformations require the mutual accommodation and blending of business and IT interests	(Gregory et al. 2015; Weill 2004; Xue et al. 2008)
Program execution	Program governance	Control vs. autonomy	Transformation programs need to control resources while giving projects sufficient leeway	(Gregory et al. 2015; Ribbers and Schoo 2002)
	Supplier relationship	Contractual vs. relational governance	Supplier relationships in transformation programs need to use both contractual and relational governance mechanisms	(Lacity et al. 2009; Poppo and Zenger 2002)
	Program scheduling	Stability vs. flexibility	Programs need to ensure both a stable foundation for project execution and flexibility to changes in the environment	(Gregory et al. 2015; Nelson and Morris 2014)
Direction of drifts		.... ← vs. →	Transformation programs drift to either of the extremes on all dimensions, which needs to be avoided by managerial counteracts	(Gregory et al. 2015)

Although the academic literature has provided initial case insights into IT-enabled transformations (e.g., Gibson 2003; Gregory et al. 2012; Ranganathan et al. 2004), the current theory on the nature of these tensions and their potential resolution strategies is built around one single case (Gregory et al. 2015). At the center of this theory and its school of thought is the belief that all IT transformation leaders need to remain 'ambidextrous,' i.e. they need to reconcile the tensions throughout all stages of a program and counteract drifts to either of the extremes through finding a midway of balanced managerial acts (see Table 1). Echoing the platitude that management is all about "the art of balancing" (Duck 1993), practitioners might easily be tempted to take these beliefs for granted in all cases and make it their maxim to accommodate for the interests of all (global, local, business, and IT) stakeholders, assuming that such a path of least resistance is the key guarantor for the success of the program.

The case of UPM, one of the global industry leaders in the pulp and paper business, and the transformation of their manufacturing processes through harmonization and replacement of global manufacturing execution systems (GMES) provides evidence that an ambidextrous approach is not always guaranteed to lead to success; furthermore, drifts may also occur away from the extremes towards the presumed 'golden mean': An initial GMES initiative drifting into such a midway had been delayed for years and ultimately needed to be terminated. UPM then fully reconfigured their transformation strategy and launched the New GMES program, which concurrently transformed business processes, IT systems, and larger parts of the organization in an 'industrialized' approach. (Our case study approach is described in the Appendix.)

As two participatory researchers, we here extract five underlying principles of industrialized business/IT transformation and reflect on UPM's approach against the backdrop of the commonly forwarded tensions in IT transformation research (Table 1). We then examine whether these principles represented more balanced or more extreme resolution strategies, and exemplify how each principle was instrumental at a specific stage of the program: While UPM program managers indeed had to make different balancing acts during the program execution, it was crucial in this hypercompetitive business environment to maintain and emphasize the extremeness of the industrialized transformation plan throughout all stages despite major turbulences. Our results therefore not only provide practical insights on how to implement extreme transformation strategies and balanced program execution through adequate micro mechanisms, but they also emphasize the previously undertheorized fit of transformation planning dimensions with the firm's business strategy.

Case Background

UPM's Paper Business

UPM is a producer of paper and wood products that has a long tradition in the forest industry. The corporation, which today is listed as UPM-Kymmene Corporation at NASDAQ's Helsinki stock exchange, originates from the merger of Kymmene Corporation and United Paper Mills in 1996. Since then, the company has massively grown, primarily by the acquisition of competitors inside and outside of Europe, including Finland, Germany, Austria, China and the United States. In 2008, by the time of the New GMES program started, the company employed 25,000 people working across six continents; despite turnover growth, UPM today employs about 20% less staff.

The global paper business faces challenging market conditions. Global demand for paper keeps decreasing in the European and North American markets and the industry is plagued by overcapacity and fierce price competition. UPM's merger history was not only part of a successful business expansion, but also a strategy necessary to reduce capacity from the market and replace it with modern and more sustainable facilities where needed. Over the past decades, the company also had to downsize capacities to meet profitable customer demand and ensure efficient use of its remaining production capacity without endangering customer deliveries.

As of the time of the GMES program, the UPM paper business comprised 21 production sites (paper mills) with different machine configurations, all of which were originally functioning as independent entities. In its strategy to sustain profitability, the company has not only reduced and renewed production capacities, but also strived to consolidate support functions such as administration, supply chain, and IT from each of these formerly independent companies to create synergies and build a truly global operating model. A global administration with headquarters in Helsinki was established in the years after the merger, supply chain became a global business function in 2008, and a radical reorganization of IT was started in 2004 to enable more expeditious business changes and to standardize the IT service offering.

The Need for a Global Capability in Manufacturing

At the beginning of the new millennium, the company had succeeded in moving to global business functions for sales and marketing as well as for supply chain; newly introduced enterprise resource planning (ERP) systems supported these functions. As a next step in optimizing global capacities, it was targeted at closing the remaining 'gap' in the global value chain by reorganizing the manufacturing process, the company's core value generating process that links upstream supply chain activities with

downstream marketing and sales. With the move to a truly global operating model, the more urging need to unify manufacturing executing systems (MES) arose. MES represent a layer in-between the ERP system and process control systems. MES enable high degrees of automation and integration and are therefore extremely critical to the business. For example, MES users have to be very well trained, and a production stop at just one paper mill, e.g., caused by a system failure, is estimated to cost the company approx. 50,000 Euros per hour.

Given the merger history, around 2001 the company operated more than ten different MES at its 21 production sites with varying degrees of functionality, tailor-made, and from three different vendors. Each MES was paid for by the mills and supported by dedicated local IT staff, which made maintenance and support comparably expensive and was incompatible to the vision of a global operating model for business and IT. A new business capability from harmonizing manufacturing execution was therefore not only expected from a more robust and more centralized production planning that better utilizes the company's globally available capacities. Benefits were also expected from consolidating vendor licenses, streamlining upgrade and release management cycles, and thus enabling an efficient and effective global IT support model for manufacturing execution.

The Failure of the Initial GMES Initiative

In 2002, the company launched the initial Global MES (GMES) initiative under leadership of the IT organization and in close partnership with an international systems provider. The goal was to provide a single standard MES to all UPM paper mills within a tentative time frame of 3 years for starting implementations at 16 production sites. The development of this new system was to be based on the mills' presumed requirements as well as on technological advancements in manufacturing and automation technologies.

After a feasibility study and solution evaluation phase, a supplier was selected at the end of 2002. A business design for the GMES was created based on both business requirements and a global standard that built on the functionality of the supplier's software product called IPS (Integrated Paper Solution). A small IT team was established with the responsibility to manage the global standard solution and channel in new development ideas as well as to support the local implementation projects, while the mills controlled the local rollout projects and their budgets independently. The first pilot rollout of the initial GMES program started in 2004 and was immensely delayed, and only four other rollouts were accomplished until 2008. This was due to several challenges with the chosen approach, which directly relate to the tensions described earlier (Table 1):

First, UPM management had assumed that, once a sufficient number of paper mills had implemented an improved MES solution, this would by itself evolve into a standardized global solution for all mills. During the first rollouts, however, it showed that the local *business process needs were often very differentiated and thus conflicted with an intended global standard solution*. The mills showed a tendency to interfere with the global standard development and rather pursued their old, local ways of working, and in some cases even ended up keeping some of their legacy systems. Eventually, all five mills implemented significant local enhancements, which caused *development and integration efforts* that delayed project completion, made application management difficult, and finally undercut the overall business case.

Second, this program with *mixed business and IT ownership*—i.e., led by global IT, but controlled and paid for locally by the mills—generated limited commitment to propose and implement harmonized manufacturing processes and suffered from a lack of empowerment to push through any of the intended standard ways of working. For example, when the pilot mill ordered an enhancement which later proved to be redundant compared to standard system functionality, the IT team was practically unable to argue against these alleged business needs. As a consequence, the program team increasingly slipped into the role of an intermediary that merely passed on the needs of the mills to the systems supplier in an uncontrolled attempt to meet the mills' demands.

Third, when it became more obvious that mills were not only in control of their project budgets, but also had *the autonomy to decide on additional requirements within their local projects*, the supply partner started taking commercial advantage of this situation by implementing and charging more mill requirements as necessary and agreed, despite the presumed existence of a global standard. As a striking example, different interfaces to the same global sales and logistics systems were implemented at different

sites. In this *misunderstood partnership model*, code quality and compliance of the systems supplied to the mills were not always on an adequate level. Software releases often had to go back to the development stage jeopardizing the project schedules; the overall program was forced to provide the *flexibility to adjust the schedule* and prospective rollouts had to be postponed.

After having spent millions of Euros and implemented five versions of a standard software product, UPM's management realized that these locally optimized versions limited the global support potential and would not help in achieving a global manufacturing capability. In 2007, UPM and the supplier agreed on an improvement project to bring the five affected mills at least on a similar technological level and correct the software deficiencies.

Five Principles of Industrialized Business/IT Transformation

UPM's top management was highly unsatisfied with the outcomes of the initial GMES initiative. By 2008, a major reconfiguration was decided in the strategy to succeed in the desired transformation of manufacturing execution at all production sites. This reconfiguration included staffing a new program organization for the GMES initiative, evaluating an alternative systems supplier, and bringing in an independent management consultancy to support the new program organization. In collaboration with the external consultants, a plan was created on how to turn around this challenged initiative and launch the 'New GMES' program, which considered the learnings from UPM's earlier attempt and paved the way for an *industrialized* approach to this transformation of business processes and IT systems.

The authors of this article reflected on this turnaround strategy from the retrospective asking: Which were the key principles that characterized the industrialized approach to business/IT transformation? The outcome of this exercise is a list of five principles, out of which the first (global template based) is deemed the most important, see Table 2. We adhered to the term 'industrialized' as a collective label for all five principles for several reasons: First, prior authors have encouraged more broadly to apply industrialization principles (such as automation, mechanization, and serial production) also to IT management activities (e.g., Piccinini et al. 2015; Zarnekow et al. 2006). Secondly, applied to IT transformation programs, the term 'industrialized' particularly emphasizes the reusability of concepts, procedures, and solution templates in each project (i.e., principle 1). Finally, the metaphor of an industrialized transformation was instantly understood by all key program stakeholders at UPM since it clearly resonated with the company's process industry context.

In the following, we first explain each of the five principles in an ex-post generalized manner and then relate them to one of the tension dimensions commonly forwarded in the literature on IT transformation programs (see earlier Table 1). After that, we highlight each principle's implications for UPM's new GMES program as of the time program was launched (2008) as opposed to the prior GMES approach and explain the principle's key mechanisms. This comparison of the new GMES principles and old GMES approach along the different dimensions is also summarized in Table 2.

Principle 1: Global Template-based

Following a global template-based approach means that the changes at each entity (e.g., each production site) should follow the exact same pattern. This pattern or 'template' not only refers to the IT solution, but also the business processes that are to be implemented, as well as the project management approach and all other related activities that are necessary to make each local project a success. This principle places an emphasis on the reusability of concepts and the replicability of the work steps of a transformation program at different entities almost like on an industrial assembly line. Moreover, each of type of template should have a defined owner within the global program organization. Deviations from these generic templates are only allowed if they are approved by the respective template owner. Following this principle implies a huge upfront investment in any program for generating and detailing out these template concepts, since they must be well crafted to be understandable and applicable to each of the industrialized projects (e.g., local rollout projects). With respect to the first two dimensions of tensions in transformation planning (Table 1), the global template-based approach therefore represents an *extreme conflict resolution strategy* in that it *standardizes* business processes globally and concurrently *replaces* IT systems across all production sites.

Table 2. Five Principles of Industrialized Transformation (compared to prior GMES approach)

Key dimensions	Prior GMES approach	New GMES principles	Key mechanisms for implementing each principle at UPM
Business processes (standardization vs. differentiation) IT architecture (replacement vs. integration)	Drift towards a 'middle way' with locally differentiated processes and IT solutions	**1. Global template based** (standardization of business processes and concurrent replacement of legacy IT systems)	- High upfront investment into planning - Global business process blueprints - Global technology solution standard and template configuration - Reusable management concepts on program and project level
Ownership (business vs. IT ownership)	Drift towards ineffective ownership between global IT and local business	**2. Global business driven** (emphasizing business ownership over IT ownership)	- High profile business sponsor - Major business representation in steering committee - Business process owner network - Push instead of pull requirements management
Program governance (control vs. autonomy)	Highly autonomous projects with limited program-level control	**3. Matrix organized** (balancing program control with autonomy of projects and streams)	- Comprehensive program management office - Matrix of projects and cross-functional streams - Liaison roles and stakeholder networks across the organization - Mutual deliverable review for managing quality
Supplier relationship (contractual vs. relational governance)	Misunderstood partnership model where supplier took commercial advantages delivering inferior quality	**4. Close supplier steering** (exercising strict contractual and relational governance with the supplier)	- Regular and separated supplier steering meetings - Contact points on all levels and clear escalation procedures - Zero-tolerance deliverables and milestones - Joint lessons learned sessions after rollouts
Program scheduling (stability vs. flexibility)	High project flexibility jeopardizing the overall program timeframe	**5. Cascaded scheduling** (balancing program stability with project and stream flexibility)	- Fix schedule for overall milestones - Rolling wave planning for detailed activities - High parallelization of rollouts within clusters - Local project responsibility with aligned schedules

In the case of UPM, this newly agreed principle meant a huge shift compared to the philosophy in which the old GMES program had operated. Instead of starting off with a vendor solution as a global standard and then continuously 'drifting' towards a middle way with more and more locally differentiated enhancements, this principle demanded to first invest into specifying the company template for the target business processes—the business blueprint—, and only then build the technical solution—the solution template—, before both, new processes and new IT, would be implemented concurrently at each of the production sites. In addition, it also demanded that the local rollouts themselves would proceed in a highly replicable manner, including similar timelines, work packages, roles and responsibilities—which had not been the case in the old GMES program either. The new GMES program management estimated that management concepts were needed for global rollout planning, local rollout project management, IT realization management, test management, change and communication management, as well as for quality and risk management. Their specification went hand in hand with the staffing of the program and the empowerment of the template owners. Consequently, the entire first year of the new GMES program was allocated for a ramp-up phase, in which a major goal was to create these generic concepts and build up the required program internal capabilities.

Principle 2: Global Business-driven

Making IT-enabled transformation programs business-driven refers to ensuring business ownership of decisions of across all levels of the program. On the highest level, a business-driven transformation program would typically install a high profile business executive as a sponsor to ensure the top management's attention and allow enforcing even tough decisions. In addition, to ensure broad backing leading representatives from all business areas that are part of the transformation need to be appointed to the steering committee, together with key IT roles such as the CIO. Moreover, the program level needs not only sporadic participation of business users, but full-time and part-time staffing of experienced business managers, who will be able to own the processes that are being affected by the transformation program. One approach is the formation of a business process owner network, i.e., full-time appointment a chief business process owner who can rely on the specialized expertise of multiple sub-process owners distributed across the organization. While prior literature has suggested that IT transformation always require a blending of business and IT interests (Table 1), this principle can be regarded as an *extreme resolution strategy* (cp. Table 1) in that it *emphasizes business over IT ownership*.

For UPM, this 'push' principle of driving change through global business leaders was diametrically opposed to the prior 'pull' approach where the paper mills raised their local demands to global IT. First of all, it required all stakeholders to understand that GMES was not merely be a systems implementation project initiated by IT, but a corporate-wide effort to transform the ways of working in manufacturing—which may also involve adverse ramifications from a local mill perspective. A high profile divisional president was appointed sponsor and Chair of the program steering committee with accountability for the overall program. The committee included senior leaders from manufacturing, mill representatives, supply chain, as well as corporate controlling and IT. As opposed to the old GMES, which was run within IT, the newly appointed Program Director reported directly to the Chair of the steering committee. A global business process owner (BPO) with broad experience in paper manufacturing was appointed to the program as the head of the business processes subproject. The first task assigned to this role was to establish a network of process owners with specific expertise for the sub-processes of mill order handling, production planning, raw materials, reel production, quality, sheet production, packing, warehouse operations, and outbound logistics. A key expectation was to leverage this network to decide competently on local requirements and to push through globally harmonized business processes. Hence, additional requirements from the local level would only be accepted if they provided global value at other sites, too.

Principle 3: Matrix-organized

Matrix management generally denominates organization structures in which indiviudals are managed with more than one reporting line and which are intented to stimulate collaboration and avoid silos (Galbraith 1971). In our context, the matrix refers to a program organization in which cross-collaboration between differerent projects and work streams is facilitated and gaps of responsibility are avoided through 'close-meshed' responsibilities. The larger transformation programs get, the higher are the uncertainties about the dependencies between the different program activities. Matrix program organizations aim to ensure comprehensiveness by locating key tasks at the 'intersection' of two roles. For example, rollouts may run as autonomous projects which, however, compete for global resources. Therefore a cross-project rollout manager is staffed as a lateral role that works in close alignment with the different local project managers and coordinates across the projects for aligning overall resource constraints and schedules. Hence, matrix program organizations balance the common tensions (Table 1) between *autonomous task execution and an adequate level of peer control.*

The organization structure of the new GMES program employed the methaphor of a house, see Figure 1. This structure was different from the way the prior GMES initiative was set up both in the size of the program and in the degree to which roles and responsibilities were detailed out. In addition to a dedicated program management office (PMO), the program organization consisted of three major (types of) subprojects: business process blueprint, IT realization, as well as the local rollouts, each with dedicated full and part time resources. To build the matrix, three cross-functional *streams* were introduced to span across these subprojects: test management (coordinating all user test activities), rollout management (coordinating rollout schedules), and release management (coordinating ongoing upgrades). All subproject managers and stream leads reported to the the Program Director. The PMO, including program planning and tracking, resource management, contract management, quality and risk

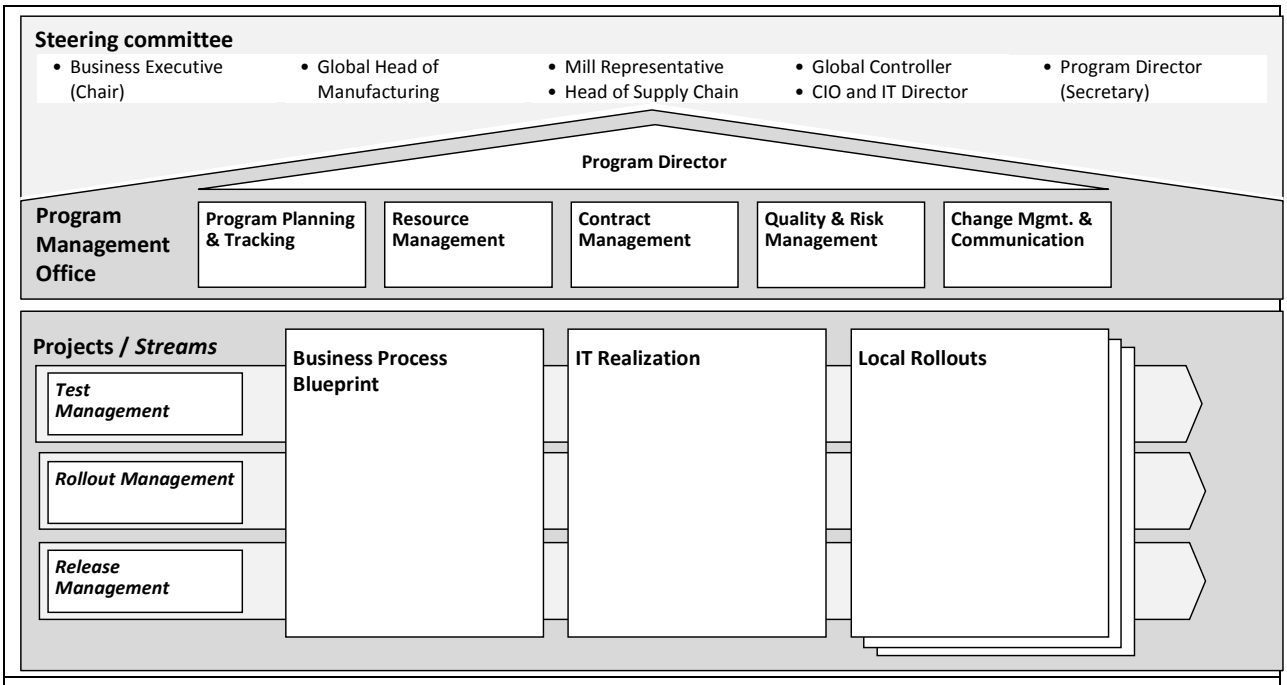

Figure 1: Matrix-organized GMES Program Organization at UPM

managment, and change management and communication roles, monitored the progress of all streams and projects, tracked the financials, managed the main supplier linkage, and also facilitated a quality and risk process. In addition to the control through the PMO, it was agreed as part of the quality process that all deliverables and documentation would be reviewed by at least one other peer in the matrix to ensure the quality of the work products and the close alignment between the different projects and streams.

Principle 4: Close Supplier Steering

This principle refers to a model of a client-provider relationship that emphasizes tight control, defined procedures, as well as close working relationships and mutual understanding through both contractual and relational governance means (cp. Lacity et al. 2009). The close supplier governance specifies clear contractual obligations and high powered incentives for the supplier to perform. Over the duration of the program this close governance can be enforced over a separate governance body for all supplier-related issues (instead of having a supplier participate in the program's main governance bodies). On the relational side, there should be defined contact persons on for all activities that require supplier involvement, e.g. test management, rollout management, release management, etc. and clear lessons learned and escalation procedures. In case of supplier underperformance, these procedures help facilitate the communication and understanding of the goals set for the supplier and a routinized flow of action to handle potential issues. Overall the close steering model therefore *blends contractual and relational supplier governance mechanisms* (cp. Table 1).

At UPM, this principle meant first and foremost that the relationship to the MES vendor—whosoever would be selected in the triggered supplier evaluation process—would be structured as a closely governed client/supplier relationship, and not as the misunderstood partnership model in which the old GMES program had operated. Eventually, the prior system provider was given a second chance, but under a much tighter regime: This supplier would have to prove its capabilities to deliver on time and with good quality in clearly defined milestones under a zero-tolerance policy. A separate supplier steering committee was established chaired by the Program Director to control delivery and serve as a central point of escalation. Besides quality-metrics based penalties, it was clearly communicated and contractually defined that any violation of the defined zero-tolerance milestones would lead to contract discontinuation and a subsequent supplier switch. In addition, joint lessons learned sessions were organized after every rollout to analyze potential issues and address improvement potentials in the supplier relationship.

Principle 5: Cascaded Scheduling

This governance principle advises a program scheduling and tracking methodology, which balances strict overall schedule adherence on the program level with certain the degrees of freedom in the detailed planning, thereby aiming to reduce program complexity and increase parallelization. Multi-year transformation programs—while pursuing clearly defined strategic goals—are unique efforts that typically exhibit an immense degree of uncertainty especially during their early stages. Cascaded scheduling therefore demands to perform planning at different levels of the program and by different roles, e.g., on steering level, program level and project/stream level. Detailed schedules by project and stream leads may be consolidated in a master plan for the purpose of transparency and regular progress reporting. Detailed plans can be updated and fed into the master plan in a rolling wave planning cycles, while the major milestones are agreed on steering level. Consequently, the cascaded scheduling principle *balances schedule stability on the program level with flexibility* on the project and stream level (cp. Table 1).

Compared to UPM's old GMES program, which was basically run as five related and partly parallel projects with loosely agreed endpoints, the cascaded scheduling principle was a novelty inasmuch as for the first time an integrated, detailed program master plan had to be created for this industrialized approach. Consolidating the first detailed stream and subproject plans into this master plan was a significant effort for those who were used to have mill managers and the supplier to dictate the schedules. However, with each of the updates of the master plan, which were agreed to take place in quarterly cycles, this iterative scheduling process was expected to become more of a routine. Weekly progress reporting started based on this master plan. While the rollout manager took responsibility for aligning on the overall sequence of the template-based rollouts, detailed schedules for each mill would be integrated into the master plan like any other subproject. Progress at the steering level was reported against the major program milestones, including the zero-tolerance milestones of the supplier.

Industrialized Transformation in Stages

The new GMES program was designed to run through four major stages: ramp-up, pilot, rollouts, and program ramp-down, see Figure 2. Although the five principles—the former two of which we characterized as *extreme transformation planning* principles, and the latter three as *balanced program execution* principles—were crucial throughout all the stages of the program, we will focus on the most pertinent examples and highlight using selected quotes how the principles were instrumental to overcome these challenges at specific points of this transformation program, as illustrated in Figure 2.

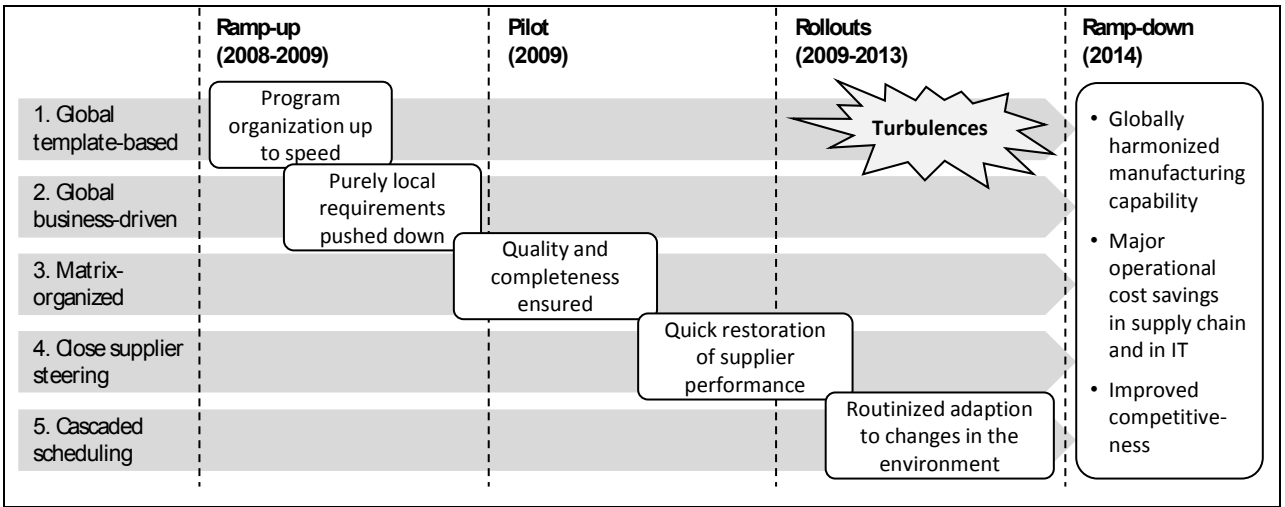

Figure 2: GMES Timeline and Benefits of the Industrialized Transformation Principles

Ramp-up Stage

The program planning and ramp-up stage started formally in February 2008. At this time, the new GMES program also incorporated the one-year improvement project, which was a supplier obligation to fix the software deficiencies at the four paper mills affected by the prior GMES rollouts.

Over the one year of the ramp-up phase, the program organization was incrementally built up, hand in hand with the creation of template-based concepts (principle 1). Project managers were appointed for the business processes and the IT realization subprojects, stream managers were staffed for rollout management, test management, and release management, and the PMO was extended by dedicated resources for planning and tracking, quality and risk management, as well as change management and communication (see Figure 1). In addition to their high-level role descriptions, new members of the program were required to develop a detailed concept how to structure their role and set up their work area (i.e., subprojects, streams, and PMO functions). Whenever possible, these concepts were supposed to be reused as template based plans in the rollout projects to enable parallel controllable implementations.

At the very beginning, the new program personnel was somewhat concerned about the high demands of the program planning and the tremendous work—rollouts at 15 production sites—lying ahead. However, when the idea of an industrialized and global template-based approach (principle 1) was understood, the program team got more excited about creating these concepts, which would help them later on to deliver their work in a more serialized fashion, and about testing these concepts in a real life environment. The principle of a template-based approach was crucial in this first stage to manage the program members' concerns and get the program up to speed. One of the program members who joined towards the end of the ramp-up recalls:

> *"I did not feel any concerns among the team at the time on ramp-up anymore. It was already like a well-oiled machine when I joined." (GMES Test Manager).*

Regarding the template for the future manufacturing execution business processes, the business processes subproject practically had to start from scratch and under great time pressure with creating a proper business blueprint. Here the program's business-driven approach (principle 2) made it much easier for the Program Director to rationalize the need of additional resources for this subproject. Business process owners were assigned part-time to the project and started the business blueprint development together with process consultants from supplier side. The blueprint was outlined based on five representative mills' business processes. Here and later in the program, the business-driven approach (principle 2) was crucial to push down numerous local requirements from the mills that would otherwise not have added value to the global template. The blueprint even demanded from the improvement project to dismantle certain local enhancements from the four existing old GMES mills. The global BPO remembers:

> *"If I think about our steering committee, it was a clear enabler. We didn't have any difficulties in the business processes team, because we had a clear mandate. For example, at [one mill] they had huge amount of production recalls, which were not able to deliver in GMES. Then, the message was clearly given for them: That's the new way of working, and this was also understood in the field."*

Although the one-year ramp-up stage was a fairly long and laborious planning exercise, the global template-based and business-driven approach (principles 1 and 2) helped to build necessary capabilities on the program and pave the way for the forthcoming rollouts. One member of the GMES steering committee commented:

> *"I was positively impressed on the rollout concepts. For the first time it seems that a technical engineering-like planning was applied and will be followed like initially planned." (mill representative)*

Pilot Stage

The program execution started in April 2009 with a first pilot. The program steering committee had identified a smaller production site in Western Europe for bringing the industrialized transformation to the test. The rationale behind this selection was the expected lower business complexity at this site, which had just one production line, the lower business risk as well as an urging need for a new MES due to the

mill's deprecated legacy systems. Although the local project manager appointed for this pilot rollout was generally positive about the global rollout concepts, the members of the program were excited and nervous at the same time about the first usage of their industrialized approach.

The template rollout approach foresaw a sequence of activities: As part of the change management and communication approach, two separate mill information sessions were conducted to explain the strategic background, the necessity, and the benefits of the manufacturing process changes at the site. After nomination of the local team, the rollout itself started with an industrialized kick-off meeting. In line with the industrialized rollout plan, this local project was centrally scheduled and went through the five phases of preparation, usage planning, site realization, startup, and post go-live. Overall more than 150 different tasks and activities had to be coordinated for this single rollout, including hardware procurement, systems walkthrough, pre-configuration, user training, development of local interfaces, data migration, technical testing, user acceptance testing, and ultimately the go-live (or cutover). From the paper mill's perspective it was of utmost importance to minimize the planned production break. The industrialized cutover concept specified by the IT realization subproject consisted of a meticulous minute-by-minute plan for all start-up day activities. After the go-live day, an operational test run period, site acceptance procedure, transition to line organization, lessons learned interviews, and post go-live process review concepts were applied.

In planning and preparing for these manifold activities, the matrix principle (principle 3) proved to be a great enabler to make sure that these concepts fit with each other and no work step was forgotten. For example, the global test manager had to urge the IT subproject to provide quality metrics for the technical testing, in order to be able to determine if and under which conditions the site acceptance tests could proceed. Since all the concepts had been quality-assured by at least one other program member in the matrix in a peer-review fashion, the different work steps of this industrialized pilot rollout were well aligned with each other in terms of timing, resources, and technical dependencies. The test manager recalls:

> *"It was a kind of quality assurance to check the deliverables from the other streams. So the test entry criteria were a good example: At the pilot mill, we had to check that all the deliverables of the IT and business streams were completed. And after a few rollouts, that became sort of an automatic task."*

The pilot project went live smoothly and as planned in autumn 2009. The global quality and risk team interviewed the users and the mill management and the program office made immediate proposals for further improvements to the program concepts. The pilot mill's management commented after the pilot:

> *"We have good feedback on GMES. The project has been well explained from the very beginning. GMES program experiences need to be spread to other UPM projects as well." (General Manager)*

Rollouts Stage

The main stage of this multi-year transformation initiative started late 2009. The global rollout concept foresaw that rollouts would take place in five clusters, starting with less complex production sites in the first cluster and ending with specialty paper mills (those which have a separate sheeting section for paper cutting) in the final cluster.

The global rollout plan implied that each cluster would have to fit a maximum of three to five parallel rollouts within a timeframe of less than one year. These parallel rollout activities particularly put the supplier under great pressure due to the numerous technical intricacies at each site including machine interfaces and the few globally approved local enhancements that were released. The first major challenge on supplier side arose already in cluster 2 of the parallel rollouts. More than once, approval of the go-live delivery was jeopardized due to too many severe software and integration issues during the operational test run periods. The former Program Manager at supplier side explains:

> *"The work load at first was huge and that caused some resource limitation and a little bit of challenges for us to start those project and of course, when we work simultaneously we cannot control that everything and every rollout is fully made in*

> *the same way. We had to onboard new people to the processing who at first did not really understand the idea of the industrialized concept."*

In these types of situations, the principle of a close supplier steering with joint problem solving processes came to play (principle 4). Any delivery related issues were escalated and addressed behind the closed doors of the supplier steering meeting. In particular, it was reemphasized that there was zero contractual tolerance for delays on the major milestones and that in case of non-delivery on the agreed quality metrics, the continuation of the vendor relationship and extension of the contract for the next rollout cluster was at stake. Eventually, the vendor relationship stabilized after rollout cluster 2 and the quality of program deliverables, both on UPM internal and on supplier side, was perceived good or excellent based on the mill management's evaluation.

> *"It took a little bit time, few rollouts, until we got it working also on our [supplier] side. It was something that you have to learn to get from the old habits to the new ones, but the message of UPM was very clear." (Supplier Program Manager)*

Organizational Turbulences

Over the four years of the rollout stage, the GMES program had to cope with several major turbulences in the internal and external environment, in particular with changes in the IT organization as well as with further mill acquisitions. In the beginning of 2010, as the program was approaching the third rollout cluster, UPM's group IT launched a plan to change the IT operating model including the decision to outsource the infrastructure operations for the global mill execution systems to a third-party. This reorganization in IT also affected the program schedule and structure. During 2011 then, UPM acquired a medium-sized competitor with six production sites. Although it was decided that two of the acquired paper mills were subsequently to be dismantled, the program had to reschedule the remaining program to enhance the scope of this industrialized transformation and accommodate for four additional rollouts. The acquisition announcement and plan to close two mills affected the program schedule severely and the global program personnel and supplier capabilities became heavily stressed, although the initial industrialized strategy was maintained.

The GMES scope was eventually enhanced by an additional cluster and an upgrade project, and the GMES schedule was extended until mid 2014. The principle of a cascaded scheduling (principle 5) was instrumental to facilitate these and other schedule changes. The integrated master plan provided the program management with the needed transparency to make informed schedule decisions, while breaking down the complexity of each re-planning effort by delegating it to the different program members. Schedule changes were already part of the 'rolling wave' program procedures, i.e., something the program members had routinized. Therefore, once these scope decisions were made on UPM's portfolio level, the program could again benefit from its templates and pick up with the industrialized rollout procedures. The supplier's key account manager explains:

> *"When you run a program like this in the industry you normally can't just make changes to the organizational scope. But, this was done within GMES program, new mills coming in and going out from the scope and it happened actually quite fast, because it was very well planned. So if you have very strong methodology you can do it, otherwise I would say that this would not have been possible."*

Ramp-down and Results

The last of the GMES rollouts started in fall 2013 and marked the beginning of the program ramp-down. The last mill operated a highly automated production of quality paper sheets and was regarded as the one of the production sites with the highest complexity. At this time, the GMES steering committee had decided to take the identified risk of starting ramp down of program resources and let the process owners to transfer in line organization, given the good track record of the program. The cutover itself went well but in the post go-live period, the mill suffered severe process and performance deficiencies, amongst others due to the dependencies of GMES with the contingent business processes (sales, logistics), and the recovery with limited program and supplier resources took longer than expected. The local project manager remembers:

> *"There was only one person who was familiar with the systems in detail and who could solve the problems. This was the bottleneck and at the later stage it was became really a disturbance for the project, not only for the development, but also for the problems after the go-live. For me the learning was to have backups of key resources in these project areas which are really complex."*

Despite these challenges in the completion of the last rollout, the GMES program had overall gained such good recognition that UPM management mandated this downsized program to also assume responsibility over ongoing GMES release management for another half year and coordinate between the systems supplier, the new infrastructure operator, and UPM. The Chairperson praised the program:

> *"The program team managed to contribute relevant best practices and ensured effective implementation in practice. Noticeable was the highly competent expertise, the pragmatic and solution oriented way of working, and the collaborative and professional behavior towards customers on all levels combining firmness and modesty."*

The evaluation of the last rollout was also the trigger for an overall program review. GMES had realized the targeted business benefits from an improved and more efficient global solution: First, global business process harmonization enabled UPM to implement standardized mill execution functionality and thus to centralize production planning to regional supply chain centers and consequently to steer and control supply chain operations better and more efficiently. Second, GMES accomplished the coordinated replacement of legacy systems throughout all sites and enabled improved application management capabilities with lower overall license and maintenance fees, standard application support processes, and simplified version and release management, enabling improved systems quality. Third, the GMES program implementation had enabled the group IT to reorganize manufacturing IT systems services and support globally. Altogether, UPM realized the business case of the planned annual operational savings of several million Euros in IT expenses while enabling globally harmonized planning capability in manufacturing. This capability has given UPM further scale in their business operations:

> *"Perhaps the biggest benefit is really production planning and what has happened in supply chain, that was possible only because of GMES. At the moment, more or less all production and supply chain activities are concentrated to [two specific locations]. And that has been the biggest single business advantage provided by GMES" (Global BPO).*

Case Discussion and Theoretical Implications

While the success attained after the turnaround of UPM's GMES program lends credibility to the usefulness of the five industrialized transformation principles in this specific case, we believe this case also offers important theoretical implications for the nascent literature on IT-enabled transformations. We started out by outlining the common dimensions of tensions in transformation planning and program execution (Table 1). Overall, the five principles at UPM address these tensions and thus provide further support for the relevancy of appropriate resolution strategies in cases of IT-enabled transformations (see Table 2).

However, while prior literature has suggested that IT-enabled transformations should remain ambidextrous and thus balance these tensions on all their dimensions (Gregory et al. 2015), the industrialized transformation at UPM chose a comparably *extreme* trajectory regarding transformation planning (i.e., planned business process change, planned IT architecture change, and ownership of the change): The industrialized approach involved a global *standardization of business processes* through *replacement of IT systems* across all sites in a coordinated and replicable effort (principle 1). In addition, instead of "blending of business and IT interests" (Table 1), this transformation strategy clearly *emphasized business over IT ownership* (principle 2). These extreme strategies were mandated to avoid drifts to a midway, as experienced in the prior GMES initiative (Table 2). In particular the drift towards locally differentiated processes implemented to different versions of a standard IT solution, accompanied with a drift towards ineffective sharing of decision making between global IT units and local business owners were thus avoided.

In contrast to these extreme resolution strategies on the planning level, the industrialized approach used *balanced* resolution strategies on the program execution level (cp. Tables 1, 2). In particular, the program used a matrix structure (principle 3) that counteracted autonomy of its subprojects with vertical and lateral control mechanisms; the close supplier steering (principle 4) combined elements of both strict contractual and relational governance of the supplier; and the cascaded scheduling (principle 5) helped balance overall program schedule stability with flexibility on a project and stream level. These balanced execution principles were necessary to avoid the prior drifts towards high project autonomy, a misunderstood supplier partnership, and an overstretched schedule flexibility as experienced during the initial GMES attempt. Thus, these execution-level principles conform to the literature on tensions in IT-enabled transformations (in particular to Gregory et al. 2015).

In the light of the current theory of ambidextrous IT transformation programs (Table 1), the case of UPM's GMES program raises two questions. First, why were extreme strategies needed on the planning level in order to be successful? Here we argue that the nascent research on IT-enabled transformation has undertheorized the contingent influence of a firm's business strategy and generalized prematurely: In UPM's hypercompetitive paper business context—a mature industry characterized by fierce price-based competition and consolidation developments—the standardization of business processes through unifying IT systems was a due strategy to support the company strategy of moving to a global operating model and further exploiting global scale. While IT was the enabler to align with this "defender" type-of company strategy (Miles et al. 1978), this transformation of the company's core operations (i.e., the manufacturing process) also made a clear ownership through global (not local) business stakeholders indispensable.

In contrast, the retail banking case that provided the setting for developing Gregory et al.'s (2012; 2015) theory of "IT transformation program ambidexterity" was placed in a context in which IT-enabled business innovation such as digital banking innovations played a major role, in addition to the persistent efficiency pressures on IT. Such innovation goals also required the "blending of business and IT interests in the spirit of IT-business partnering" (p. 1). However, as these authors bring into consideration (p. 41), "extending [the] analysis to multiple different case contexts might have yielded additional dimensions that [they] could not currently find due to the specific characteristics of [their] single case."

Thus, taking the findings from both of these transformation cases together, we argue that transformation planning is highly contingent on the firm's business strategy: if the business strategy is of a defender type (as with UPM), then transformation planning may need take more of an extreme character; if the business strategy itself is of an ambidextrous type (as in the retail banking case), then (and only then) this should be reflected in a balanced transformation planning approach. Although prior literature has provided vast prior evidence for the need of aligning business and IT strategy (see Chan and Reich 2007; Sabherwal and Chan 2001), the notion of fit between a firm's business strategy and specific IT transformation planning dimensions to date has remained undertheorized.

The second theoretical question arising from the UPM's GMES case is: Why were the resolution strategies on program execution level at UPM then apparently *not* contingent on the business strategy? Here we argue that the tensions in program execution are largely invariant of strategy contingencies, since they have more of a managerial character (cf. Duck 1993). The goal of program execution is essentially to use program resources effectively to achieve a given goal (Ribbers and Schoo 2002). For example, by having projects work with sufficient degrees of autonomy, while retaining their control, internal resources are used effectively; by steering suppliers closely the external resources are used more effectively; and by balancing program stability and project flexibility, programs remain prepared for changes in the environment, which may occur in any type of company context.

Consequently, taking current IT transformation theory and the UPM case together, we conclude that balancing managerial mechanisms on program execution level are a universally applicable strategy to resolve tensions in any IT-enabled transformation context. In other words, while program execution is a vehicle to implement different firm strategies; the methods for implementing these strategies is not contingent on the nature of these strategies itself. Program execution should thus be understood more as a methodology than as a strategy in itself.—Whether the wording of 'ambidexterity' (cf. Gregory et al. 2015) is thus appropriate on the program execution level may be subject to discussion, given that the ambidexterity term has primarily been used to denote a firm's learning orientation on the strategic level (see Birkinshaw and Gibson 2004; Raisch and Birkinshaw 2008).

Concluding Comments

Although IT-enabled business transformation programs are widely recognized as key vehicles to implement and support specific firm strategies, we know surprisingly little the about the approaches for resolving the common tensions in these multi-year initiatives and the nature of their potential fits to the business strategy. Given the recent emphasis on ambidexterity in the debate on strategy and IT-enabled transformation programs (e.g., Gregory et al. 2015), transformation leaders might be tempted to always search for a 'midway' approach that balances the various extremes, in order to accommodate for the interest of all global, local, business, and IT stakeholders and seek a path to program success.

The case of UPM's GMES program teaches us not to assume an ambidextrous approach without further consideration of the strategic context: UPM program managers had to learn that, while diverse balancing mechanisms were required for the program execution, an *extreme* emphasis on the global template-based and business-driven transformation plan was crucial and necessary to achieve the desired global capability in manufacturing and realize the planned operational cost savings that help UPM compete its hypercompetitive industry consolidation environment. The UPM case therefore provides evidence for the contingent influence of business strategy in planning IT-enabled transformations. Yet, since we also acknowledge the limitations of our single case perspective, future research is encouraged to address further (e.g., highly innovation-oriented) company contexts to validate the proposed fit of transformation planning and business strategy in the spirit of a beginning, cumulative research tradition in IT-enabled transformations.

Contrasting UPM's specific approach with the current knowledge on ambidextrous IT transformations, we labelled UPM's strategy an *industrialized* business/IT transformation and described its underlying five core principles. Practitioners can learn from these principles how to implement extreme transformation planning and balanced program execution through adequate micro mechanisms, such as appropriate governance bodies, coordination processes, and lateral roles (as summarized in Table 2). Even before closure of the GMES program, it was advised internally at UPM to use the industrialized methodology as a best practice also for other change initiatives, and—although this industrialized approach had initially set the supplier under great pressure—today, the GMES program continues to be used as one of the supplier's prime customer references. Overall, given that UPM's market environment and internal capabilities are deemed similar to those of other globally operating firms in manufacturing and other mature industries, it seems safe to say that making an upfront investment into planning an industrialized program can pay off in the longer run by being able to standardize business processes globally and replace IT in a coordinated, concurrent, and replicable effort.

Appendix: Case Study Approach

The multi-year case study insights in this paper have been collected in several stages combining inside and outside modes of inquiry (Evered and Louis 1981). In his prior role as an IT manager at UPM, the first author collected qualitative subjective observations over the period of the transformation of the IT function and the initial GMES initiative at UPM. This precursory research was complemented with the personal insights of the authors who were both involved with the GMES program: The first author acted as the Program Director of the new GMES program throughout its entire duration (2008 through 2014). The second author supported the ramp-up phase of this program in an external consultant role from 2008 to 2009. Based on their own recollection and by consulting information from various internal documents including steering meeting minutes and rollout reviews, the authors compiled a case narrative (including of a draft version of Section "Industrialized Transformation in Stages" and a short recap of the five principles).

In order to validate this narrative and ensure inclusion of additional perspectives, semi-structured interviews of 30-60 minutes were conducted with key knowledge carriers at UPM (3 in business, 3 in IT) and at supplier side (2), who were involved with the GMES program in different roles (see Table 3). Besides asking for feedback on the narrative, the interview guide also included questions regarding each of the four main stages of the transformation program, as well as regarding the five industrialized transformation principles, whereas each interview focused on those topics the interviewee was most knowledgeable about. The interviews were led by the second author and audio recorded with the consent of the participants. The interview transcripts were analyzed by both authors regarding comments that

supported, complemented, and corrected the authors' initial narrative. This revised paper is the result of a discussion of these comments. All quotations provided in this article are either based these interviews or on other original sources.

Table 3: List of Interviewees

#	Organization and role	Involvement in GMES program (incl. timeframe)
1	UPM Global Business Process Owner	Project Lead for Business Process Blueprint (2008-2010)
2	UPM Global Solution Owner	Process Owner Prod. Planning, Business Blueprint project (2009-2014)
3	UPM Mill Production Manager	Process Owner Manufacturing, Business Blueprint project (2011-2014)
4	UPM Global Solution Owner	GMES Test Manager (2009-2011), Global Rollout Manager (2011-2013)
5	UPM Mill Processes and Systems Mgr.	Local Rollout Manager in a cluster 4 mill (2010-2014)
6	UPM Head of Business/IT Services	GMES Steering Committee and ext. Program Mgmt. (2008-2014)
7	Supplier Service Delivery Manager	Program Manager for the GMES Program on supplier side (2008-2014)
8	Supplier Key Account Manager	Key Account Manager for UPM during and beyond the GMES Program

Acknowledgements

The authors thank all interviewed stakeholders who shared their insights and experiences and gratefully acknowledge the permission of UPM to publish this case study. We would also like to acknowledge Jens Dibbern (University of Bern) for valuable comments on an earlier version of this paper.

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