Towards a Fast Enterprise Ontology Based Method for Post Merger Integration

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ABSTRACT
Our research program aims at finding and testing method components for deciding on and implementing organizational splits and mergers. We tested a method to timely detect design & migration issues of a Post Merger Integration. Using actors from Enterprise Ontology as organization building blocks for two large operationally merging airlines, experts systematically listed per actor (a) its organizational implementations, (b) its Quality of Business and (c) its IT implementations. The drafted DEMO Construction Model appeared to be the first neutral and shared language for describing the essence of the business. Also the results needed for decision making (a) were experienced as a necessary and sufficient validation of operational integrity and (b) were delivered fast, yielding a high Return On Modeling Effort.

Categories and Subject Descriptors
H.1.1 [Systems and Information Theory]: General systems theory, Information theory; H.5.3 [Group and Organization Interfaces]: Organizational design, Theory and models, Evaluation/methodology; K.4.3 [Organizational Impacts]: Reengineering.

General Terms
Management, Design, Verification

Keywords
Post Merger Integration, PMI, merging organizations, merging IT systems, migration issues, Enterprise Networks, Enterprise Ontology, DEMO, Return On Modeling Effort, Operational Integrity.

1. INTRODUCTION
In the last decades the amount and value of Mergers & Acquisitions (M&A’s) have been continuously increasing, with a local maximum of USD 2,039 billion in the first half of the year 2007 (M&A’s in 2008-H1 fell back with 54%) [13]. Reasons for M&A’s vary from offensive – increase of revenue or market share, broadening the product portfolio or market, acquiring product know how, economies of scale – to defensive ones – protecting against hostile take-over, preventing the market share growth of competitors, ability to bear the burden of compliance costs and tax optimization [5]. To create the intended performance after an M&A, an integration mechanism should be in place to harvest the positive synergies, the combination potential, as signaled before the merger [18].

The question how to execute such a Post Merger Integration (PMI) is not an easy one. In spite of M&A popularity, researchers commonly [27] (1) suggest that approximately half of all M&A have proven unsuccessful and (2) identify several success factors in areas such as strategy, planning, goal setting, assigning migration responsibilities, speed, communication, culture, retention of key staff and key customers, structured e.g. [10] in a framework with the dimensions Organization & Management, Processes & Products, People & Culture and ICT. However, our literature search [15] shows, confirming Alaranta and Henningsson [2] on the IS-aspect, that a well-underpinned method for Post Merger Integration of processes and ICT is lacking.

We propose a method that is tested in a real-life case study and that ensures well-founded decision making on the right abstraction level, timely signalizing design & migration issues. In its way of thinking, experts from two merging companies used an Enterprise Ontology – as defined by Dietz [11] and expressed in a DEMO Construction Model (CM) – to formulate the common essence of the business and to systematically list (a) its organizational implementations, (b) its Quality of Business and (c) its IT implementations. In its way of working, the method includes identifying the Enterprise Ontology, testing it by event traces, establishing its current and future implementations, and evaluating this objective findings according to its meaning for design of and migration towards the TO BE situation. We found the drafted DEMO Construction Model to be the first neutral and shared language for describing the essence of the business. Also the results needed for decision making (a) were experienced as a necessary and sufficient validation of operational integrity and (b) were delivered fast, yielding a high Return On Modeling Effort.

The case-study was conducted at Air France KLM Cargo (AFKLCargo), a business unit of Air France KLM Group. AFKLCargo is the nr 1 European carrier of international air freight, serving more than 400 destinations, with worldwide local presence in 100 countries. The turnover in the fiscal year 07/08 was 2.9 billion Euro. AFKLCargo was created in October 2005 after the merger of Air France and KLM in May 2004. In the new structure the commercial activities of Air France and KLM Cargo were integrated into a single organization, consisting of Sales, Customer Service Organization (CSO), Revenue Management (RM), Marketing and Network Development. The operational
activities (OPS) remained in separate organizations, but its strategy and activities are strongly coordinated. An important element of the PMI was the decision at the time of this case-study to move towards a single IT system portfolio for both companies.

The remainder of this paper is structured as follows. The research design in section 2 outlines the problem statement, introduces the way of thinking and embeds this in a way of working. Section 3 describes the actual intervention at Air France KLM Cargo (AF-KL), of which section 4 discusses the results. Finally section 5 provides the conclusions, as well as directions for further research.

2. RESEARCH DESIGN

2.1 Problem statement

The CIAO [9] research program “Applying Architecture and Ontology to the Splitting and Alllying of Enterprises” [22] aims at finding validated principles and organization construction rules, whose application leads to adequate splitting and alllying of enterprises. We define an enterprise as a goal-oriented cooperative of people. Adequate alllying includes operational integration after a merger, the so-called Post Merger Integration (PMI). When a PMI is finished, roles and responsibilities are actually assigned to people in the new (merged) organization, means are allocated and management is authorized to use them.

![Diagram](image1)

Figure 1. DEMO CM Order taking at Air France KLM Cargo [1]

Informally speaking, when we say merging enterprises, we mean the activity that results in assigned roles, responsibilities and means to newly merged organizational entities. Consider for example the order taking for AFKL Cargo, for which Figure 1 shows a part of the Construction Model (CM) from the DEMO (Design & Engineering Methodology for Organizations) method [11]. In this CM, the actor order taker (A04) operates with different Quality of Business (QoB) for two different initiators: (1) customer (CA01), with whom an order to ship a cargo (T04) initially is agreed upon, and (2) shipment acceptor (A16), which receives the shipment (T16) from customer (CA01) at the Cargo warehouse; when this shipment significantly differs from the previously agreed order (T04) – a common practice in the air cargo industry – shipment acceptor (A16) will request adjusting the order to order taker (A04), who in turn might renegotiate with customer (CA01). To ensure compliance with commercial policies, commercial policy maker (A09) will periodically issue these policies (T09), which in turn are used by alo order taker (A04) – indicated by the dashed line from A04 to T09. Examples of the different QoB-parameters for transaction T04 are (a) the time-to-completion, which is shorter when initiated by shipment acceptor (A16) – the shipment is waiting in the warehouse to be shipped – and (b) the complexity, which is higher when initiated by customer (CA01) – first compliance of the customer to commercial policies has to be ensured. A possible merging decision now could be that order taker (A04), initially implemented in two different organizational units of the original organizations and supported by different (a/o) ICT means, will be implemented in one organizational unit in the future organization by common ICT means.

![Diagram](image2)

Figure 2. Generic System Development Process [12]

More formally, we will treat merging enterprises as the implementation-part of a specific case of the Generic System Development Process (GSDP) defined by Dietz and Hoogervorst [12], which we will now briefly introduce, using Figure 2. In every design process there are two systems involved, the using system (US) and the object system (OS). The OS is the system to be designed; the US is the system that will use the functions or services offered by the OS once it is operational. Function design, the first phase in the design of the OS, starts from the construction of the US and ends with the function of the OS. Function design delivers the requirements of the OS, so a black-box model of the OS. This black-box model clarifies the behavior of the OS in terms of (functional) relationships between input and output of the OS. This function model of the OS does not contain any information about the construction of the OS. Construction design, the second phase in the design of the OS, starts with the specified function of the OS and it ends with the construction of the OS. Construction design bridges the mental gap between function and construction, which means establishing a correspondence between systems of different categories: the category of the US (where the function of the OS is defined) and the category of the OS. Construction design delivers an ontology, the highest level white-box model of the OS. This white-box model clarifies the internal construction and operation of the system in terms of collaboration between its elements to deliver products to its environment. By an ontology or ontological model of a system we understand a model of its construction that is completely independent of the way in which it is realized and implemented. The engineering\(^1\) of a system is the process in which a number of white-box models are produced, such that every model is fully derivable from the previous one and

\(^1\) Engineering is meant here in the narrow sense of the term, contrary to its general use in civic engineering, electrical engineering, mechanical engineering, etc.
the available specifications. Engineering starts from the ontological model, produces a set of subsequently more detailed white-box models and ends with the implementation model. By implementation is understood the assignment of technological means to the elements in the implementation model, so that the system can be put into operation. By technology we understand the technological means by which a system is implemented. A wide range of technological means is available, including human beings and organizational entities, ICT artifacts (e.g., phone, email, computer programs) and mechanical means. In general, the design freedom of designers is undesirable large. Dietz and Hoogervorst [12] therefore define architecture (1) conceptually as a normative restriction of design freedom and (2) operationally as a consistent and coherent set of design principles that embody general requirements, where these general requirements hold for a class of systems. Those principles can be functional or constructional, i.e. restricting the function resp. the construction design of a system. In terms of GSDP, we now define merging the enterprise as the first step in making an implementation model of the enterprise, namely re-assigning responsibilities and means to organizational units (so not to functions or individual people yet) in the – one – new organization, restricted by a subset of the principles, namely the organization construction rules.

To find the organization construction rules that guide decision making on merging organizational units and assigning means, we repeatedly execute merging processes, controlling the in- and output. This fits in the notion of action research, defined by Avion et al [4] as a repeating cycle of intervention, measuring, evaluation and improvement. In action research, the researcher selects or develops new concepts and tools, in our program organization construction rules for merging organizations, to use it (or let it be used) in new situations. Each case study in the program, including this one, has its own sub problem, method, result and conclusions. As Lee [19] shows, studying single cases can satisfy the standards of the natural science model of scientific research.

Where does this case-study fit in the action research cycle? Dietz [11] proposes to use actors of an Enterprise Ontology according to DEMO as organization building blocks. Op ‘t Land et al [21] applied such a use of actors in implementing a (post-merger) Shared Service Center, especially in the decision making on its TO BE organization and ICT; however, not a complete DEMO CM was used here. Later case-studies [26], [25] applied complete DEMO CM, however only on the organizational side.

What guidance does current literature on Post Merger Integration (PMI) give on actually constructing the newly merged organization, given that the functional (black-box) questions (following e.g. Bruner [8]) have been answered? Pautler [27] shows that lots of literature on mergers and PMI deals with typical pre-merger and black-box PMI questions, such as effects of mergers & acquisitions and how to measure its. As far as the literature actually concern the constructional part of PMI, it explains (1) success and fail factors [28] – such as combination potential, degree of organizational integration, employee resistance [17], coherent integration strategy, strong integration team, communication, speed in implementation and aligned measurements [14] – (2) attention areas – such as planning, goal setting, assigning migration responsibilities, culture, retention of key staff and key customers, structured e.g. [10] in a framework with the dimensions Organization & Management, Processes & Products, People & Culture and ICT – and (3) hi-level Plans of Approach for executing a PMI. Also according to our own literature search [15], an how-to method for Post Merger Integration of processes and ICT, well-underpinned with concepts of merging and its rules on a constructional level – e.g. what is a common language on processes and ICT, how does it help to steer the PMI, how can we obtain a realistic view of efforts and risks to be expected during realization – is however lacking, which confirms earlier findings on IS-issues [2].

We expect the DEMO Construction Model (CM), of which we will introduce some additional concepts using Figure 1, to contribute in such a method. A CM expresses the coherence (chain / network) of business services, delivered by actors to other actors within a defined scope. E.g. actor A04 executes transaction T04, which delivers a business service to actors CA01 and A16. CA01 and A16 are called initiator and actor A04 executor of transaction T04. Execution of transaction T04 results in a new fact in reality. In his responsibility for execution of T04, A04 needs to know about ongoing and past transactions T09; this information link between actor A04 and (the fact bank of) transaction T09 is indicated by a dashed line. In the fact bank of T09 we find both the production facts and the coordination facts (like status “requested”, “promised”, “stated”, “accepted”, “declined”, “promise cancelled” etc) of the instances of transaction T09.

So we seek for a PMI method on a constructional level, which helps in detecting design & migration issues in organization and ICT, and which is also fast – with an attractive Return on Modeling Effort (ROME). What should such a PMI method look like?

### 2.2 Proposed method: way of thinking

Assuming the merger between two organizations Org1 and Org2 has already been decided upon, we propose the following method to timely and systematically discover design and migration issues for organization and ICT during PMI. In the remainder of this subsection we introduce its way of thinking. In the next subsection we elaborate this into a way of working.

To answer critical design issues of the TO BE situation and also identify critical migration issues, a well-directed organizational and IT impact analysis should be performed. For that we need a certain model of the TO BE situation, mappings of that model to the AS IS situations of Org1 and Org2 and guidelines ‘where to look’ for critical issues.

As a model for AS IS and TO BE situations, we will use a DEMO Construction Model (CM), because of its favorable properties in organization and information modeling. It is neutral, independent from current or future organizational implementations, and also independent from markets, locations, customers or suppliers. In fact, it only depends from (functional) decisions on what products to deliver in what quality. A CM is also a neutral basis for determining information needs. According to Dietz [11], information needs are determined by responsibility for a specified result, so per actor from the DEMO CM. This prevents untimely looking from the perspective of current organizational units.

In the implementation model only two situations can occur: (1) a certain actor currently only exists in either Org1 or Org2, including its means; then operationally (s)he can continue that way; (2) a certain actor currently exists in both Org1 and Org2, including its means; here complexity is expected. Our hypothesis therefore reads: “we expect critical design and migration issues especially (a) where one actor is implemented in different organizational units for the same case/event, (b) where one actor is supported by different IT-systems for the same case/event, and (c) for actors with demanding Quality of Business (QoB) requirements.”
2.3 Proposed method: way of working

We will now elaborate a way of working for timely and systematically discovering design and migration issues for organization and ICT during PMI, building on the expounded way of thinking.

The way of working should achieve sufficient buy-in of the resulting analysis on operational integrity, meaning that political and organizational sensitive issues should be open to discussion based on observed facts. Main principles behind our way of working therefore were:

- let the DEMO CM be constructed by experts, who are not part of the sensitive issues;
- perform objective fact gathering by involving actual employees participating in the processes, especially crossing managerial, organizational and geographical boundaries;
- let interpretation and valuation of the findings – taking political and organizational sensitive issues into account – be strictly separated from the model construction and fact gathering.

We designed our approach to consist of four steps:

1. Creation & validation of a DEMO Construction Model, using existing materials such as process models (meetings I & II);
2. Creation of “implementation mappings” of the AS IS situation for organization and IT (meetings III & IV);
3. Identification of critical transactions and its design & migration issues based upon our hypothesis from paragraph 2.2 – so (a) multiple AS IS organizational implementations, (b) multiple AS IS IT implementations, and (c) a demanding Quality of Business (meeting V);
4. Evaluation and interpretation of the results in preparation for decision making (meeting VI).

We discerned five different teams for carrying out the assignment, to be staffed based on personal expertise:

1. A Core DEMO team for modeling and facilitation, consisting of one external DEMO ontology expert and several internal staff trained in DEMO;
2. A Business team for ensuring the quality of business input, consisting of CSO, RM and OPS representatives;
3. An IT team for ensuring quality of IT input, consisting of several experienced IT architects;
4. Business Subject Matter Experts (SME) that perform in daily life the chosen event traces;
5. Business executives and external experts that are able to value and interpret the gathered results.

Business event traces should be used both to validate the DEMO CM and to create the implementation mappings. Selection of the events for the event traces should be done by the Core DEMO team together with the Business team on criteria of relevance (they should occur regularly and in the critical periods), involvement of multiple actors and complexity. For elaborating these event traces business experts actually responsible for performing the tasks should be selected [7].

3. THE INTERVENTION

3.1 Assignment for the intervention

Since the start of the merger of Air France and KLM, several attempts were made to move towards a joint IT systems portfolio. Initial investigations were done on integrating the legacy platform of Air France, but this proved too costly and risky. The IT integration was then redefined as the transition from both legacy environments of Air France and KLM to a new IT environment (a program known under the working title ICT Phase 2). Software selection for this new IT environment was done based on future business vision and processes for the combined organization. The implementation will be done in three steps, focusing on the already integrated commercial organization for the first step. The operational systems will be replaced in the second step, while in a final step the then remaining legacy systems will be replaced.

Various scenarios were developed for the first step implementation of the new IT systems. Decision making on these scenarios was a difficult and complex trade-off between a risk assessment on the operational integrity of the business processes and a shorter time to market for a common revenue management implementation. In order to explain this we have to elaborate somewhat the business dynamics of air freight. The booking of freight for a specific flight usually takes place from a few days before the departure of that flight. The last bookings can come in until several hours before departure. These bookings are evaluated through a revenue management process for profitability, using the information about intended route, weight and volume. In parallel with this booking activity the actual goods arrive. With that arrival the actual information about the weight and volume of the shipment is captured. This industry characteristic leads to a highly dynamic process during the final days before flight departure, involving continuous communication and trade-offs between commercial parties (CSO, RM) and operational parties (OPS) about accepting bookings and the constraints of actually transporting them. One of the key considerations in moving towards new a common revenue management system as a first step, was the potential impact of that new revenue management system on the operational process in the last 24 hours.

It proved very difficult to compare Air France and KLM with regard to the risks and interactions in the Cargo business. In order to solve this difficulty, an intervention using the DEMO methodology was proposed as follows:

DEMO-assignment. ‘Create neutral and sustainable DEMO-models of the Cargo business, for the current processes in Air France and KLM and show in these models:

- the essential Business processes and transactions between commercial and operational domains with a focus on the last 24 hours before departure;
- the mapping of the actor roles in these processes and transactions on the AF and KL organizations (responsibilities of Sales, CSO, OPS and RM);
- the IT systems that support this transaction;
- critical design and migration issues within the preferred scenario and their proposed solution.’

3.2 Execution of the intervention

The intervention was carried out as originally proposed within a time frame of six weeks in the period April – June 2008.

The first part consisted of drawing up a first DEMO construction model by the DEMO team, which was validated in 2 sessions with the business team. This DEMO-CM was based upon the work done previously with regard to future business processes.
Next detailed business event traces were elaborated focusing on events in the final 24 hours. This was done in two groups (one from KLM and one from Air France) by gathering all relevant staff together and asking them in detail how certain events were handled. We had selected beforehand those event traces that were both complicated in terms of number of steps and parties involved, but which were also relatively common in occurrence (daily work). The output of these sessions were detailed descriptions of the actual day-to-day work conducted, including the sequence of steps taken, the organizational entities involved, the IT systems used and the communication methods applied.

These descriptions were mapped onto the DEMO-CM, leading to a refined CM with some additional transactions, which proved to be stable. In parallel the IT team reviewed the impact of the new IT systems on the current IT portfolio per transaction. Also Quality of Business was determined for the transactions in terms of frequency, maximum duration and complexity drivers.

Table 1 shows the attendance of the expert-meetings.

<table>
<thead>
<tr>
<th>Duration meeting (hours)</th>
<th>4</th>
<th>4</th>
<th>12</th>
<th>6</th>
<th>4</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group meeting:</td>
<td>I</td>
<td>II</td>
<td>III</td>
<td>IV</td>
<td>V</td>
<td>VI</td>
</tr>
<tr>
<td>DEMO team</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 1. Attendance of expert-meetings

<table>
<thead>
<tr>
<th>Group</th>
<th>Business team</th>
<th>Business SME</th>
<th>IT team</th>
<th>Business executives</th>
<th>External experts</th>
</tr>
</thead>
<tbody>
<tr>
<td>meeting:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>4</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II</td>
<td></td>
<td></td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>III</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V</td>
<td></td>
<td></td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>VI</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


4. RESULTS OF THE INTERVENTION

4.1 The DEMO CM

For the Cargo area a DEMO Construction Model was created consisting of 49 transactions, 46 actors and 203 information links. Figure 3 shows its main actors, transactions and information links.

Although AF and KL have both a long history in the air cargo area and had not cooperated before the merger, the DEMO model appeared to be valid for both airlines. Only in a minor case we detected an ontological difference. In the KLM warehouse the buildup of shipments in a Unit Load Device (ULD) is always initiated by flight handler (A22) and the amount of staff to do this is adjusted. In the Air France warehouse the number of staff is constant and if they have no request from actor A22, they will start this build action themselves.

The DEMO CM was validated by mapping event traces described by business representatives to a draft CM made by experts having both DEMO and Cargo business architecture knowledge. In these event traces the business representatives described in detail the process steps they would normally execute to handle a specific event, like a type of cargo shipment or an often occurring disturbance of the normal process (e.g., what to do if the actual size of the shipment doesn’t match the size as mentioned during the take order process). This validation of the model resulted in additional information links and some minor reconfigurations; no actors or transactions needed to be changed.

Table 2 shows the Transaction Result Table for the transactions selected (see paragraph 4.3) as most relevant and critical.
### 4.2 Mapping of organization and ICT

For each selected critical transaction its executing actor was mapped (1) organizationally, to (sub-) departments of KLM Cargo and Air France Cargo and (2) ICT-wise, to automated information systems. In Table 3, which shows a part of the AS-IS mapping-result, the percentages relate to the number of transactions executed per department – one transaction is always as a whole completed in one department – and the number of transactions processed by a ICT system – some transactions are processed by more than one ICT system, respectively.

<table>
<thead>
<tr>
<th>Transaction</th>
<th>Name</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>T04</td>
<td>Order Acceptance</td>
<td>Order O has been accepted</td>
</tr>
<tr>
<td>T06</td>
<td>Flight Profile Creation</td>
<td>Flight Profile FP has been created</td>
</tr>
<tr>
<td>T13</td>
<td>Capacity Booking</td>
<td>Capacity C has been booked</td>
</tr>
<tr>
<td>T16</td>
<td>Shipment Acceptance</td>
<td>Shipment S has been accepted</td>
</tr>
<tr>
<td>T19</td>
<td>Flight Handling Planning</td>
<td>Flight Handling FH has been planned</td>
</tr>
<tr>
<td>T23</td>
<td>Shipment Execution Monitoring</td>
<td>Execution of Shipment S has been monitored</td>
</tr>
</tbody>
</table>

### 4.3 Towards determining critical transactions

Some 20 different event traces, of which Table 4 shows an simplified example, were used to discuss the AS IS situation with the business subject matter experts. Thereby we were able to validate the DEMO CM and to map organization and ICT on it. Based on the thus appearing organizational and ICT complexity per actor/transaction and also based on the frequency component of the QoB, we determined the 6 critical transactions (see Table 2).

<table>
<thead>
<tr>
<th>Action</th>
<th>Actor</th>
<th>Transaction</th>
<th>IT Systems Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSO captures all details about the shipment (sizes, weights, handling)</td>
<td>Customer</td>
<td>CSO</td>
<td>T04-rq</td>
</tr>
<tr>
<td>CSO forwards request to BIG department in CDG</td>
<td>CSO</td>
<td>DZCA</td>
<td>T11-rq</td>
</tr>
<tr>
<td>CSO negotiates with customer to see if shipment can be fitted</td>
<td>Customer</td>
<td>T04-dc</td>
<td>T04-rq</td>
</tr>
<tr>
<td>CSO informs customer that it does not fit.</td>
<td>Customer</td>
<td>T04-dc</td>
<td></td>
</tr>
<tr>
<td>Local OPS describes number of pallets needed to sales</td>
<td>local Ops</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 4.4 Presentation of the results

To help the management of AFKL Cargo to decide how to proceed in replacing parts of the existing ICT systems, the results were put into a presentation set consisting of the DEMO CM, the abbreviated TRT (as in Table 2) and sheets per relevant actor. As Figure 4 demonstrates, such a sheet per relevant actor contains (1) the position of this actor in the network of business services as modeled in the CM – by whom is this actor initiated, which other actors need information on facts created by this actor –, (2) what Quality of Business is required from this actor, (3) what communication channels are used by this actor, (4) to what extent this is actor implemented in which departments – according to “departments in actor role” as in Table 3 – and (5) what systems are used in what extent by this actor – according to “automated information systems used” as in Table 3. By making such a actor sheet per (a) organization – Air France or KLM – and (b) migration step – AS IS, TO BE/Step1 and TO BE/Endgame –, which meant a total of max 6 sheets per actor, management was able (1) to get a clear insight in the impact of the proposed scenario for implementing new ICT systems on organization and ICT and (2) to detect opportunities for simplification of the organization, where actor roles were played in more departments than expected.

### 4.5 Evaluation and decision making

The fact finding until then made objectively clear the differences between AF and KL in organizational and ICT implementation of key transactions. This in turn objectively showed the different...
risks associated with the choice of an IT scenario for the two organizations, especially with regard to the critical transaction T13.

In the TO BE design for example, it now became clear which organizational complexity had to be solved in order to harvest the benefits of the intended revenue management tooling implementation. Also the need for measures became apparent to maintain a single and (for all participants) shared view on the critical data in the complex and intensive communication in the last 24 hours before departure.

An important detected migration issue was the way the impact of change differed for AF and KL. For one organization already the in-between situation Step1 was an improvement compared with the current ICT-landscape, where for the other organization extra investments in temporary measures without value in the Endgame would become necessary. This evaluation enabled executive management in its decision making for an IT roadmap and the subsequent assignment for the feasibility study.

5. CONCLUSIONS

5.1 Conclusions – level of this case

Within the set time frame of 6 weeks and with an investment of about 65 man-days, AFKL Cargo was able to reach consensus on (1) a DEMO CM as the first neutral and correct description of the essence of the business, and (2) its (very) different organizational and ICT implementations of this CM in both companies. AFKL Cargo now had an objective view on risks associated with introducing a new system, especially the differences in the risks between the two companies. This simplifying view, at the same time experienced as a necessary and sufficient validation of operational integrity, enabled AFKL Cargo to choose the scenario for implementing JCT Phase 2.

Several factors contributed to the success of this intervention:

- the intrinsic preciseness of the DEMO Construction Model – e.g. using the distinctions of production and coordination, clear definitions of transactions such as T04 and T13 – gave a natural and shared stop criterion for the level of detail and enabled unambiguous counting & metrics;
- the DEMO model was seen as a neutral description instead of having a AF or KL bias, allowing objective comparison of the different implementations until executive level;
- well-educated DEMO-staff on KL-side existed;
- directly listening to the operational floor people gave a solid and undisputable underpinning on the conclusions;
- the use of business event traces in identifying actual implementations – note that the DEMO CM was not used during the business event trace sessions;
- ½ years of Cargo analysis and knowledge with regard to JCT Phase 2 was available;
- visualizing the results was started early in the process, facilitating communication on management and executive level.

As limitations of the followed approach we signaled the following. DEMO deals with the rational world; in PMI definitely the emotional and political world needs to be addressed as well. This could be solved by combining DEMO with softer approaches, such as using Group Genius [30] in an Accelerated Solutions Environment (ASE) [6]. Also the rationality of the DEMO approach can lead to “politically incorrect” conclusions, which has the potential to jeopardize the intention of the intervention. To ensure effectiveness in these politically sensitive situations, we recommend to explain the impact of the clarity, neutrality and preciseness delivered by a DEMO approach to all key stakeholders (1) to enable them to choose whether they want this clarity now, and if so, (2) to let them actively build the boundary conditions required for that, e.g. in building support and buy-in.

The following potential uses of this approach using DEMO have been identified by AFKL:

- the DEMO CM for Cargo can be used by AFKL Cargo as a reference model in the JCT Phase 2 project, since (1) it neutrally describes the Cargo business, valid for both AF and KL and (2) its will not change due to the JCT Phase 2 project, since only the implementation of the various actors will change with regard to IT systems, processes and potentially organization. In the next steps of the integration project specifically is foreseen (1) the use of the DEMO CM as instrument for impact-of-change analysis in terms of processes and ICT, (2) using DEMO CM and the Object Fact Diagrams in facilitating discussions on data ownership and (3) applying the DEMO Process Model to ensure consistency and coherence, using ongoing research results of linking DEMO CM with ARIS’ EPC [29] which guarantees completeness of process descriptions in terms of the transaction axiom and the abstraction axiom [11];
- accountability for departments and processes can now become more clear, e.g. by letting executive management assign responsibilities per actor role from the CM and by using Quality of Business and also Quality of Information ([23]) in formulating management contracts and Service Level Agreements;
- transforming the business and its collaboration with third parties, e.g. in the upcoming joint venture with China Southern Airlines, can now be controlled in an easier and better way;
- steering the business portfolio management needs an Integrated Business Case (IBC); a DEMO CM for an intended area of transformation seems well fit to be part of such an IBC;
- DEMO and its CM can be used for well-defined business service and component identification in the SOA-world [3], which is a vital part of AFKL’s IT-strategy [16].

5.2 Conclusions – level of this action research

Our hypothesis on where to expect design & migration issues has in this case been verified as far different (a) organizational and (b) ICT-wise implementations of an actor are concerned. The role of (c) a demanding Quality of Business for an actor has remained inconclusive – the frequency and response time of transactions played a role, but its potential ICT performance-consequences were experienced as sufficiently solvable that it not really made the difference in labeling actors/transactions as critical.

Also we now have demonstrated the added value of a complete CM (contrasted with [21]) to direct organizational and ICT transformation in an integrated way, where earlier research demonstrated either mainly organization-focused ([26], [25]) or mainly ICT-focused ([24]) transformation. Both organizational and ICT design and migration issues were discovered fast, with an attractive Return On Modeling Effort.

5.3 Future research directions

The fact that it was possible to relatively fast conclude on a neutral Construction Model for Cargo could point in the direction of CM’s being pretty standard and generic for a certain branch.
Comparison for more branches or supporting business functions such as Finance, HR and Procurement could clarify if this is true indeed. Another explanation could be the fair degree of standardization of the airline business; this could be clarified by testing this approach in less regulated markets.

In this case experts indicated that application of an Enterprise Ontology based approach could have been fruitful far earlier in the PMI, even without having all knowledge of the 1½ years available. It would be interesting to compare such an “optimal moment for clarifying & structuring” for several PMI-cases.

Finally we would like to see this approach embedded in a broader method for PMI, covering also the ‘soft aspects’.

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7. REFERENCES