Leading 20,000+ employees by a process-oriented management system

Insights to process management at Lufthansa Technik Group

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Abstract. As technical division of the Lufthansa Group, Lufthansa Technik and its 30 subsidiaries have to fulfill a wide variety of legislative and normative requirements. To demonstrate and ensure compliance with these requirements, Lufthansa Technik introduced the process-oriented integrated management system IQ MOVE and modeled a wide range of its processes in a plain and simple to understand methodology. Primary target group of the system are the employees who shall find all relevant procedures quickly and easily. To achieve this vision, the system is designed to increase involvement of all relevant roles (i.e., process owners, process architects, process managers, employees, and process modelers) into the creation of the content. A complementary governance model, the Framework for Assignment of Responsibilities (FAR+), enables a clear assignment of process management tasks and thus helps strengthen process management abilities and sustainability of their implementation. Based on IQ MOVE, Lufthansa Technik is able to facilitate process standardization and to lead 20,000+ employees around the world in a process-oriented way.

Keywords: business process management (BPM), process standardization, BPM governance, integrated management system

1 Introduction

Since its first BPM activities in 2002, "Finding all relevant procedures quickly and easily!" is the vision of Lufthansa Technik Group's process-oriented management system IQ MOVE and its acceptance is measured based on the acceptance of the system by the employees. In the following, we are going to explain the underlying methodologies and present insights into the functionalities and capabilities offered by the system. The Lufthansa Technik Group is the technical division of Lufthansa Aviation Group and provides aircraft maintenance, repair, and overhaul services to about 800

customers all around the world. At its 30 world-wide subsidiaries, more than 20,000 employees are performing tasks such as aircraft overhaul, component maintenance, and V.I.P. cabin completion. Basis for all aircraft-related tasks are the approvals by the respective aviation authorities from currently 60 countries. To gain these approvals, Lufthansa Technik has to demonstrate compliance with international laws and standards to the regulatory authorities. This is done based on a process-oriented management system called IQ MOVE, which was implemented within the last 10 years.
Today, IQ MOVE covers a wide range of processes from production as well as from administration. In the beginning, the implementation project focused on modeling of processes with relations to normative and legislative requirements, but in the meantime, also processes from areas such as human resources, controlling, and innovation have been documented. Especially with regards to the acceptance of the system by the employees, most efforts are directed towards production processes. Most prominent are the repair and release-to-service of aircraft and aircraft parts processes which are performed by about 12,000 mechanics all over the world. In IQ MOVE, documentation of these processes presents all relevant information for repair and release-to-service (e.g., check of maintenance records, qualifications of employees, and recording of release-to-service) and covers all necessary legal and normative requirements in one system.

2 IQ MOVE

Prior to the implementation of IQ MOVE, compliance of procedures with international laws and standards was demonstrated by more than 360 PDF documents issued by different departments and developed by about 250 authors across the company. These documents varied from 2 to 120 pages, contained a huge number of cross-references, described procedures from different points of view, and in addition, there was no way to search within the content of all documents directly. Core idea of the new system was to replace this documentation by a process-oriented, integrated management system, which enables the organization to provide all relevant information for performing a task at a single place, taking all applicable norms, standards, as well as internal and external regulations into account. To implement this idea, a web-based application was developed in close cooperation with the future users of the system, especially with employees from production such as aircraft mechanics and engineers.
Overall target of the IQ MOVE implementation was – and still is – to ensure the "safety first" principle by providing all relevant information for the safe execution of processes and educated decision-making to employees around the world.

2.1 Requirement and process management form the basis of IQ MOVE

Basically, the application consists of two major modules. A so called "Requirement Management" is designed for the implementation of all relevant requirements such as

EASA Part-145, EN9110, and OHSAS 18001[1]. Target groups of this area are authorities, certification bodies, and auditors of customers. To build up the content of the requirement database, internal Requirement Managers (1) document all applicable requirements according to their general structure within the requirement database. Therefore, the content is not simply copied into the system, but (2) all requirements are interpreted into actionable tasks.
The second module of the system (process management) contains the processes of the organization. All processes are modeled in a way, which is designed to be easily understood by all employees. Processes are stored in the Process and Document Database of IQ MOVE.
To connect requirement and process management, tasks resulting from requirements are (3) assigned to processes in the course of a so called conformity check by the Requirement Managers and (4) integrated into processes by process modeling teams (see section 2.5) before publishing of processes. Fig. 1 provides an overview of the connection of these two areas.

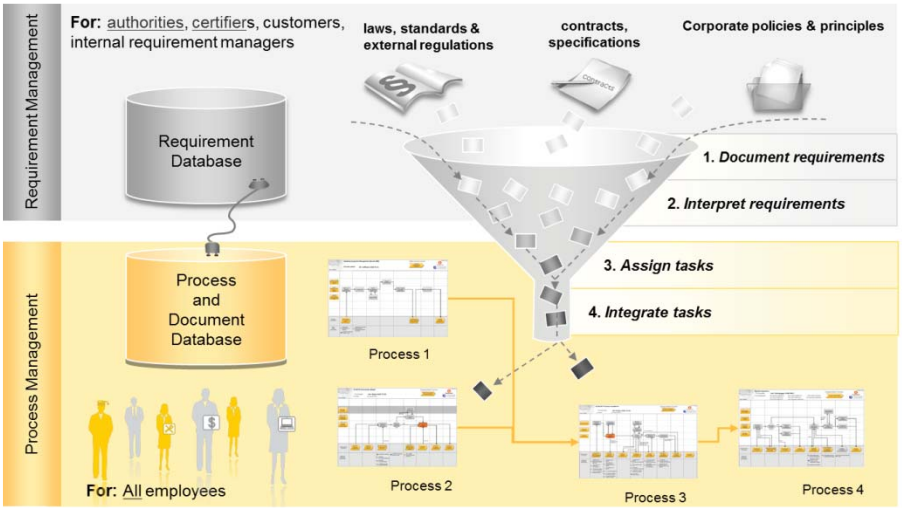

Fig. 1. Processes and requirements are connected by tasks in IQ MOVE

2.2 Process Modeling in IQ MOVE

This integration of requirements is enabled by the application of a slim process modeling methodology. This methodology consists of different modeling levels with in-

[1] EASA Part-145 describes requirements to achieve and maintain the aviation authority approval as maintenance organization for aircraft and aircraft components in the EU area. EN9110 describes requirements to a quality management system of the EN 9xxx family with specific requirements towards aviation and aerospace maintenance organizations. OHSAS 18001 describes requirements to an occupational health and safety management system to eliminate or minimize risks towards employees.

creasing level of detail. The highest level of the "process world" – with lowest level of detail – consists of process maps which allow structuring of processes from a process-oriented organizational perspective. This structure can be detailed by several levels of process maps, until a so called "process display" is reached. A process display always consists of six swim lanes which contain the roles and activities of the process and provide an overview of the process flow and the interaction of the roles. Every activity of the process is further explained by "info boxes" presenting detailed information on how to perform the respective activity as well as providing additional information on responsible roles, applicable IT systems, and related documents. These activity-related documents form the lowest level of the documentation and provide the highest level of detail by checklists, forms, examples etc.

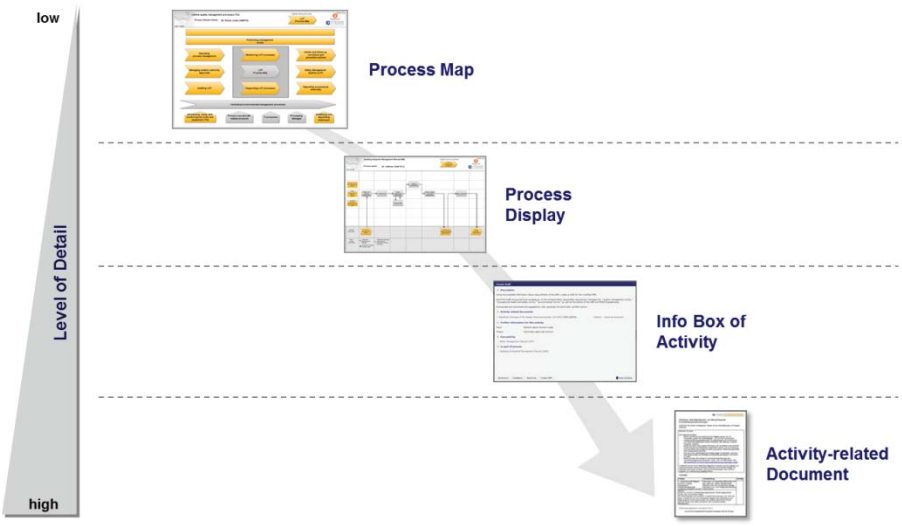

Fig. 2. Four different level of details are used to describe processes in IQ MOVE

To provide a closer look onto the design of process displays in IQ MOVE, Fig. 3 shows a sample process. A swim lane consists of nine cells. The first cell is reserved for the role which executes the respective activities placed within the remaining eight cells. In addition to activities, these cells can also contain decisions. Finally, activities and decisions are connected by solid or dashed arrows. Solid arrows describe the standard workflow; dashed arrows are used to map optional connections. Roles, activities, decisions, and connections are the core elements of the modeling notation used in IQ MOVE. In addition, two swim lanes at the bottom of the process depict up- and downstream processes for navigation between processes as well as activity-related documents for quick access of more detailed information.

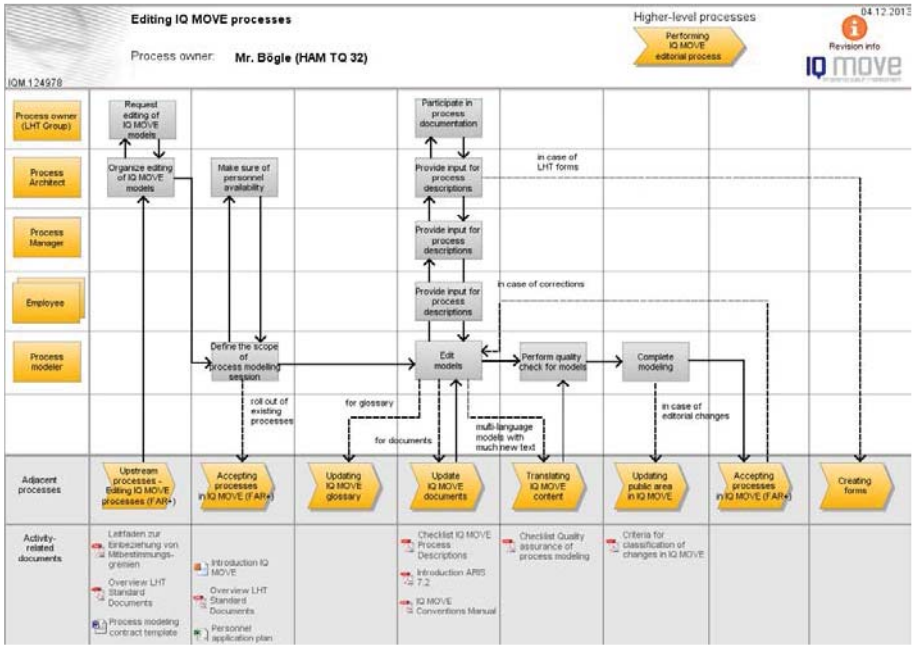

Fig. 3. Example of a process display in IQ MOVE

This reduced modeling methodology is the result of several workshops with about 100 employees during the design phase of the IQ MOVE development. Target of these workshops was to identify a style of process modeling which is easily understood by employees. As a consequence, more complex modeling elements such as operators, events, and interfaces where abandoned. Within these workshops, notations such as UML[2] activity diagrams and Event Driven Process Chains have been evaluated. BPMN[3] was not available in 2002.

Not only the process maps, but a number of additional paths enable the users of IQ MOVE to access the processes. Due to the assignment of roles to the structure of the organization, visual organizational charts can be used to open up the processes of specific roles. Also bookmarks enable direct access to frequently used processes as well as documents and a search function makes it possible to look up information throughout the whole process world. Based on the role-based modeling approach, it is possible to limit content (e.g., within search results) to processes where a user is involved in. Fig. 4 shows the interconnections of the different elements based on the integration of roles and activities within the process database of IQ MOVE.

[2] UML = Unified Modeling Language
[3] BPMN = Business Process Model and Notation

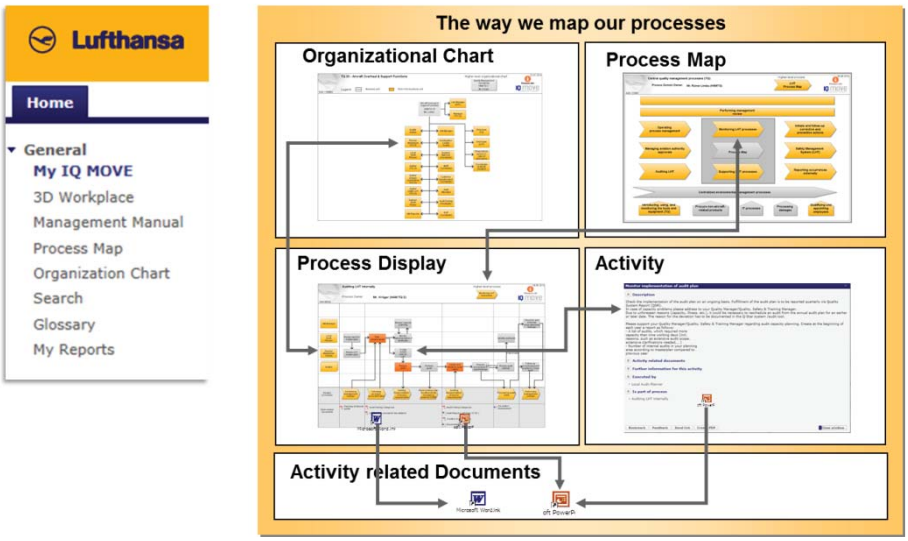

Fig. 4. Interconnection of Elements in IQ MOVE

To explain the differentiation between management system documentation and operational information, Fig. 5 presents the characteristics of both information levels. IQ MOVE focuses on generalized standard processes, i.e., the modeling of product, customer, or location specifics is avoided. This specific information (e.g., detailed technical documentation for the maintenance of all the different aircraft components) is provided by operational systems (e.g., a document management system called eDoc for the distribution of component maintenance manuals). Therefore, the detailed description of an activity contains a reference such as "Please perform the repair of the component according to the applicable component maintenance manual in eDoc".

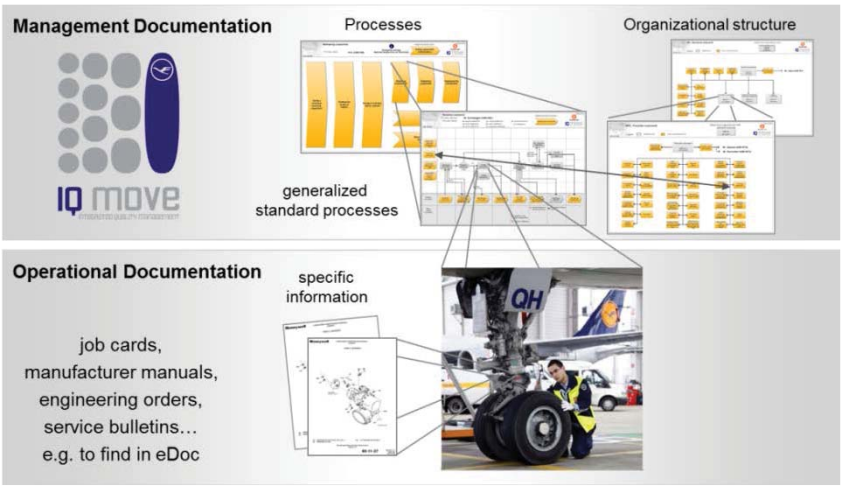

Fig. 5. Differentiation between management system and operational documentation

2.3 IQ MOVE Editorial Process

Not only the processes from production and administration are described in IQ MOVE, but also the way of how Lufthansa Technik is creating its process documentation is modeled in the system itself. Fig. 6 presents the process map of the editorial process in IQ MOVE.

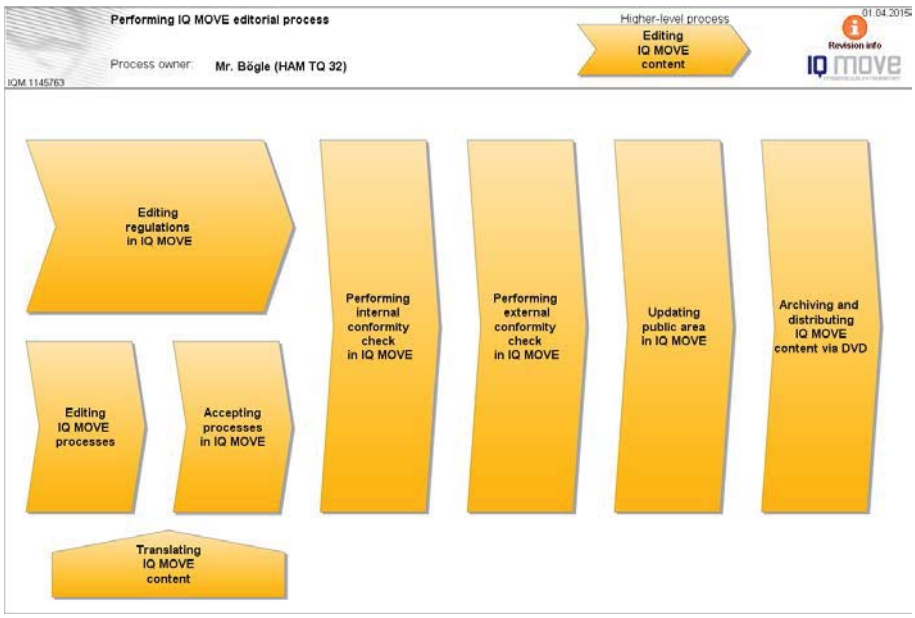

Fig. 6. Process map of the editorial process in IQ MOVE

The beginning of the process reflects the two areas of IQ MOVE. The process "Editing regulations in IQ MOVE" explains how to update the requirement database by registering and revising all relevant requirements as basis for the subsequent conformity check. In parallel, the process documentation is created as described in the two processes "Editing IQ MOVE processes" and "Accepting processes in IQ MOVE". More details on how the processes are modeled and accepted will be presented in Section 2.5.

Before publishing, all new as well as selected updated processes have to pass conformity check to ensure compliance with all applicable norms and laws. The conformity check is split up into an internal and an external check. Internal conformity check is performed by internal Requirement Managers. These experts are specialized in interpretation and company-specific implementation of laws and standards. To demonstrate compliance, tasks (which were initially created in the process "Editing regulations in IQ MOVE") are assigned to all relevant processes, content is integrated into the process models, and a status "conformity confirmed" or "adjustment necessary" is set. Only in case of a confirmed conformity check, processes can proceed within the editorial process.

Most processes will be published right after successful completion of conformity check, but for a number of processes, it is necessary to initialize an external conformity check by the Luftfahrt-Bundesamt (German aviation authority) according to a criteria list.
The process "Updating public area in IQ MOVE" explains the weekly and monthly activities for the publishing of processes in IQ MOVE. Finally, all IQ MOVE revisions are archived for later reference (e.g., in case of an incident where it may be necessary to review the former documentation at the point of time when the process was performed).
The process map is completed by a support process for the translation of processes. Target of this process is to make sure that all processes provide their information in English and all mandatory languages of the respective organizations. Mandatory languages are defined for each legal entity according to local requirements. E.g., Lufthansa Technik AERO Alzey GmbH decided to provide processes in English only, but in contrast, Lufthansa Technik AG agreed to provide processes in English and German due to coordination with worker's council.

2.4 BPM Governance according to Framework for Assignment of Responsibilities (FAR+)

As basis for the operation and improvement of processes, an adapted version of the Framework for Assignment of Responsibilities (FAR+) [1,2] was implemented to enforce process governance in 2014. The underlying idea of the FAR+ concept is the split of managerial responsibility into two general responsibilities. On the one hand, the 'process responsibility' defines *how* employees are supposed to perform processes; on the other hand, the 'disciplinary responsibility' defines *what* employees are supposed to do. Both responsibilities have to be defined for every position.
Core of the process responsibility is the Process Owner. According to a RACI classification[4], the Process Owner is accountable for process definition, improvement, and overall coordination on the level of detailed processes. To execute process definition and improvement, the Process Architect role is assigned to specialized employees who will be responsible for these tasks. In addition, the Process Manager role is assigned to persons who will be responsible for inter-organizational unit coordination of process execution within the different process instances (e.g., location-, customer-, or product-specific process execution). The fourth role within the process responsibility is the Process Domain Owner. This role can be assigned to different levels of domains and sub-domains. It is accountable for the strategic direction of the processes and sub-domains within the respective domain.
Within the disciplinary responsibility, the Line Manager is accountable and responsible for the process accomplishment of the assigned organizational unit. This includes

[4] R = role is responsible for an activity, i.e., role performs an activity, A = role is accountable for an activity, i.e. role is ultimately liable for an activity, C = role has to be consulted, I = role has to be informed. In this example, only R (role is responsible for a task) and A (role is accountable for a task) are applied.

organizational unit-specific budget fulfillment, assignment of roles to employees of the organizational unit, coordination of target agreements, and personnel development. In contrast to the theoretical FAR+ concept, Lufthansa Technik has not implemented a separate role for the administrative management of the employee (e.g., signing of work contract), but integrated this responsibility into to the Line Manager role, for the time being. The Line Manager role is assigned to managers of organizational units of all hierarchy levels. Fig. 7 provides an overview of the roles.

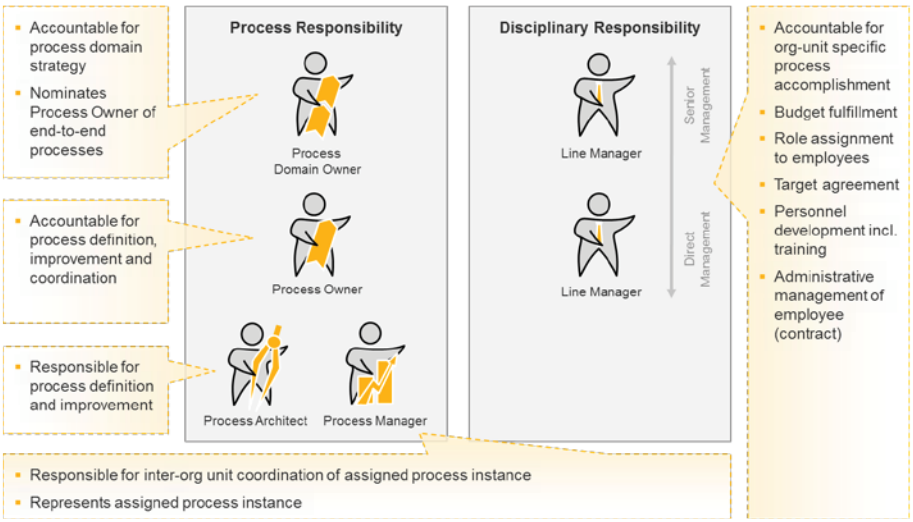

Fig. 7. Roles of the Framework for Assignment of Responsibilities (FAR+) [1,2]

In addition to the roles, structured communication flows between the different roles ensure smooth operations of processes, provide a platform for decision-making, avoid unstructured escalation in case of dispute, and align process strategy (assigned to process responsibility) with business strategy (assigned to disciplinary responsibility).

2.5 The Procedure of Process Modeling in IQ MOVE

To ensure applicability of process documentation, modeling of processes in IQ MOVE is performed, according to the FAR+ concept, by three parties in joint process modeling sessions. As first party, the Process Owner and/or Process Architect shall be involved to represent the mandate of defining a process. As second party, Process Managers and/or employees shall participate in process modeling sessions to bring in the detailed expertise of real life process execution. As third party, a so called Process Modeler moderates the process modeling session. The process modeler is experienced in Lufthansa Technik's process modeling methodology and has completed moderator trainings.

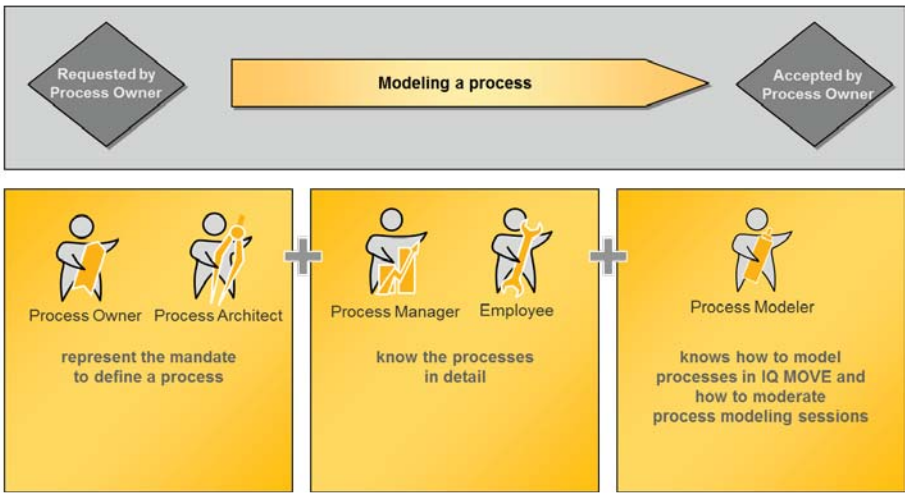

Fig. 8. Three parties participate in IQ MOVE process modeling sessions

Process modeling itself is initialized by the Process Owner. The Process Owner has to contact the responsible Process Modeler to request a process modeling session. Generally, the Process Owner (supported by Process Architect) and Process Modeler shall agree upon the scope, timeframe, and participants of a process modeling session. Based on this information, the Process Modeler invites all relevant persons to a meeting and models processes live in the system. The modeling of processes is often split up to several sessions. But in the end, the Process Owner is requested to accept the new process by a workflow in IQ MOVE.

2.6 IQ MOVE Operational Concept

To protect the investment into IQ MOVE and to further improve the system, the review board of the implementation project requested a concept for the operations of the system at the end of the project. As a result, the IQ MOVE Operational Concept as shown in Fig. 9 was developed. Afterwards, operations of the system and the editorial process were handed over to the Process Owner of the IQ MOVE system.
The concept is structured as a Plan-Do-Check-Act cycle. Core of the "Do" phase is the process "Performing IQ MOVE editorial process" (5). This summarizes all processes related to the editing of IQ MOVE content. To fuel this process, on the one hand, it is necessary to train the editorial roles of the system (e.g., Process Modelers, Requirement Managers) (4). On the other hand, user roles such as employees, managers, and process owners, but also external auditors have to be trained for the use of IQ MOVE (6). In parallel to these core processes, the Process Owner of the IQ MOVE Editorial Process cultivates the IQ MOVE community (3) by facilitating the exchange of experience between the involved roles. For example all Process Modelers are invited to a yearly "IQ MOVE Process Forum". Target of this forum is to get to know the other colleagues, to train Process Modelers with regards to changes in the

Editorial Process, and to identify ideas for the improvement of the system. The "Do" phase is completed by processes to define activities for internal and external communication related to IQ MOVE (7) as well as processes to improve the IQ MOVE IT application (8) and the IQ MOVE Operational Concept itself (9). Every two years, all users of the system – i.e., participants of the IQ MOVE Editorial Process such as employees, Process Owners, Line Managers, and Process Modelers etc. – are asked to provide feedback concerning the strength and weaknesses of IQ MOVE (10). Based on this feedback, key result areas for the further improvement of the system are identified and measures for implementation of these improvements are developed. Finally, these measures are presented to the Process Domain Owner and the senior management of the process participants (i.e., Lufthansa Technik Board) for approval within the "Act" phase (1). According to the decision of this committee, measures will be implemented within the "Plan" phase (2).

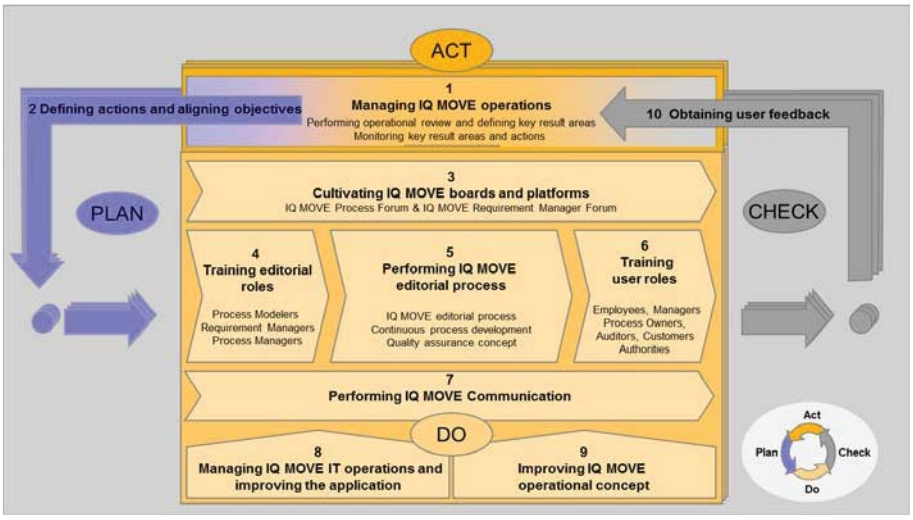

Fig. 9. IQ MOVE Operational Concept

3 Lessons Learned

Results of the biannual IQ MOVE User Feedback indicate a constant level of acceptance by the employees, but it is still a challenge to ensure the IQ MOVE vision "Finding all relevant procedures quickly and easily!" in daily work. In general, all IQ MOVE User Feedbacks confirm that the implemented process modeling methodology with its different levels of detail (i.e., process maps, process displays, info-boxes of activities and activity related documents) and the reduced number of process modeling objects (i.e., roles, activities, and decisions) is easily understood and simple to use. But due to the complexity of the real life processes, complexity of process documentation increases by time and Process Owners, Process Architects, and Process Modelers continuously have to keep documentation as slim as possible.

The development and implementation of FAR+ was a measure derived from the results of the IQ MOVE User Feedback in 2011. Target of this measure was to strengthen the already existing role of the Process Owner to ensure continuous improvement of processes, proper process accomplishment at all locations, and comprehensive training of process participants. First results of the evaluation of the FAR+ implementation confirm that the concept helps to improve the system with regards to these aspects, but it is obvious that the simple assignment of the FAR+ roles does not fully enable all employees to perform their roles according to the concept itself. Due to this, additional workshop series have been started to especially support Process Owners and Process Architects by offering a structured process operation concept. This concept was developed based on the generalized IQ MOVE Operational Concept and will be offered to all Process Owners within the next year. Core of this generalized process operations approach is a simplified process lifecycle which is supported by BPM tools and methodologies.
With regards to the overall setup, auditors (e.g., EN9100/9110) distinguished IQ MOVE as industry benchmark for the implementation of a process-oriented management system which is operatively used by 20,000+ employees and managers around the world.

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