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Knowledge Management in Challenging Settings – A Case of Military Aircraft

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Abstract: Besides typical challenges related to knowledge management (KM), EADS Military Aircraft is facing some specific challenges resulting from the company's history as well as from its position in the military environment. This descriptive case study reports on the specific challenges and state-of-the-art of KM within a military company and presents some KM initiatives related to these challenges. Furthermore, challenges are related to corresponding concepts and criteria for selecting specific methodologies to tackle upcoming challenges. Finally, the authors are concluding this paper with several key success factors for KM within this environment and give an overview of the next steps.

Keywords: Knowledge Management, Knowledge Sharing, Case Study
Categories: H.4.0, J.7, K.4.3, K.6.1

1 Introduction

EADS Military Aircraft (EADS-M) is facing typical challenges related to globalisation, R&D, and knowledge management [e.g. Gassmann and von Zedtwitz, 2003]. These challenges include the improvement in transparency and re-use of knowledge [see Markus, 2001; O'Dell and Grayson, 1998] as well as a further development of a knowledge sharing culture [see von Krogh, 1998] or the handling of the not-invented-here-syndrome [see Katz and Allen, 1982] etc.

Additionally, the company is facing an imminent loss of knowledge due to the company's age pattern. Approximately 1300 out of 3500 employees (at selected locations) are aged between 50 and 55 and are therefore expected to retire within the next few years taking their knowledge with them. Although not all of these retiring employees are single source experts, the risk of losing key knowledge is extraordinary

high, taking into account that the military aircraft industry concerns specific topics with only 3-5 experts across Europe.

Further specific challenges are related to the historic development of the company. Due to several mergers and acquisitions as well as re-organisations of companies and business units in the past, knowledge sharing across units has been difficult. Different corporate cultures have been merged and former competitors, mainly DaimlerChrysler Aerospace AG (DASA), Aerospatiale Matra, and Construcciones Aeronáuticas S.A. (CASA), now have to work on common goals and share their knowledge.

Furthermore, political and economic challenges related to the aerospace industry are resulting in major changes. Currently, the trend towards developing and purchasing system solutions requires close collaboration with suppliers. This results in the possibility to outsource and re-use systems in multiple products on the one hand, but raises the question of "which knowledge can be outsourced and which knowledge – and key competences – have to remain internal"?

This situation and vital security issues in military settings lead to the main question, being answered in the course of this paper:

How to tackle the above mentioned challenges and prevent imminent loss of knowledge by transferring knowledge of leaving experts?

2 The Knowledge Management Framework at EADS-M

Within the last several years, EADS-M has started to develop and implement a holistic knowledge management approach.

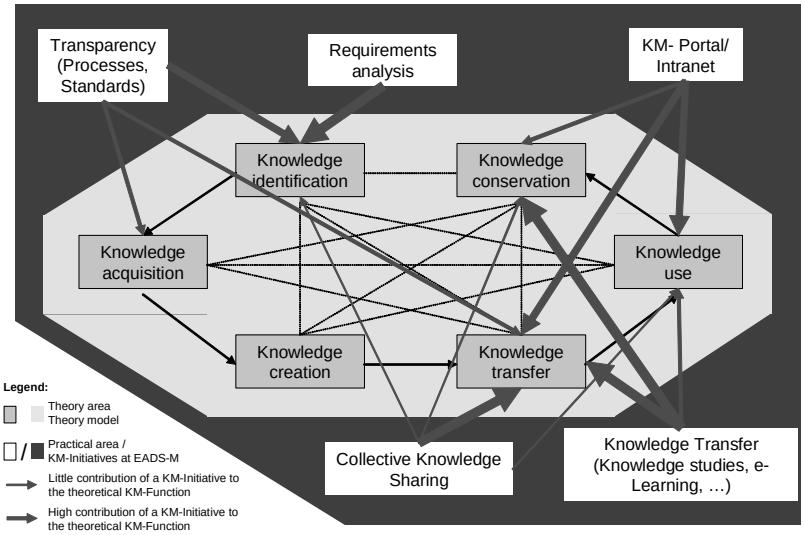

Figure 1: EADS-M – KM Framework related to [Probst et al., 1999]

2.1 The Methodological Framework

Based on the knowledge management model of [Probst et al., 1999], the concerted set of KM initiatives can be seen and assigned to their major impact on knowledge processes [see Figure 1].

2.2 The Organisational framework

As [Lubit, 2001] states, "having a sophisticated knowledge management department is crucial". The KM department at EADS M is organised as a staff unit which evolved from the human resources department. It has the objective of being an enabler for and a provider of KM services for the operative units.

Therefore – similar to a matrix organisation, it closely collaborates with knowledge engineers (being responsible for KM) and managers of operative units. Hence, the KM department is responsible for educating knowledge engineers and enabling KM. These activities are including support for revealing KM demand, consulting for methodology selection based on available time, number of involved employees, available resources, and planned budget, as well as operatively supporting knowledge engineers. Nevertheless, the operative unit respectively the knowledge engineer within the unit is responsible for performing the activities.

As KM has to be seen as a "dynamic and continuous organisational phenomenon" [Alavi and Leidner, 2001], KM at EADS-M should also become a part of the operative units' everyday work.

2.3 Knowledge management vs. Security & Confidentiality

Regarding individual knowledge transfer, security and confidentiality issues are of little importance, as the receiving person subgroup is restricted to a few people, who are already involved in the topic or are subject to the common security guidelines.

Confidentiality issues are more relevant when knowledge is to be articulated and stored, resp. transferred and made available to the general public (inside EADS-M).

Therefore, EADS-M is following a "need-to-know" approach in order to restrict access to explicit knowledge to a defined person subgroup. These access control lists can be easily managed on the portal solution "M on Air".

3 KM Initiatives at EADS Military Aircraft

Within the following paragraphs, the authors are describing several KM initiatives which are contributing to the above mentioned challenges.

3.1 Knowledge Management Requirements Analysis

The KM requirements analysis is answering the question of where to implement further KM initiatives and identifies key knowledge areas (see Figure 2). Therefore, it is the starting point for any KM activity and is also answering the question of which knowledge is vital, and which knowledge can easily be shared with outsourcing partners.

Based on strategic company goals, core competencies – capabilities which are characterising the company and are required to create a core product – are identified and prioritised together with the strategy department, resulting in a competency tree [see Prahalad and Hamel, 1990, p. 81 f.].

Following this competency-oriented KM approach [see Probst and Raub, 1998], together with the related operative business unit, relevant knowledge areas are identified, strategic knowledge objectives are defined and prioritised. The aim is to develop and apply methods from KM in order to support the identified knowledge objectives. Therefore, a target/actual comparison is required, which needs to support the definition of certain parameters. Finally, decisions for achieving operative knowledge objectives are taken and actions are defined.

The requirements analysis achieves the alignment of the KM actions and methods with the company's strategy as well as with the "real" needs of business units. Therefore, a close collaboration with the strategy department as well as with the operative business units is required and leads to a mixed "top-down – bottom-up" approach.

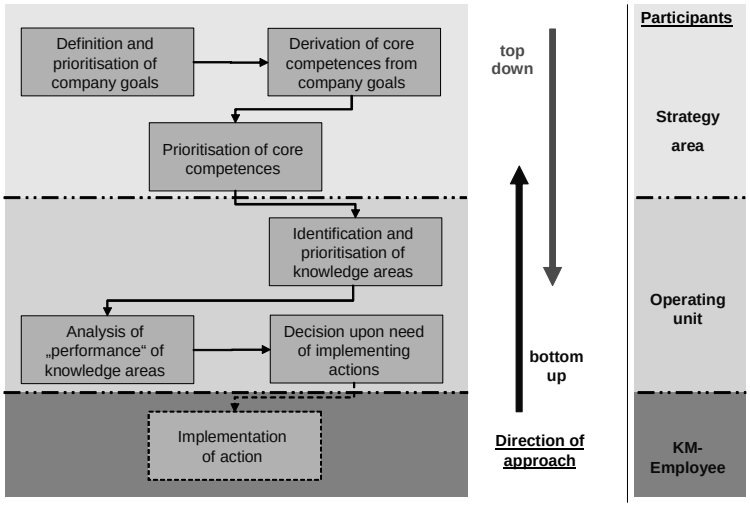

Figure 2: Knowledge Requirements Analysis

3.2 Knowledge Transfer

According to [Probst et al., 1999, p. 224 f.], knowledge transfer is either the centrally organised distribution of knowledge to a group of people, or the transfer of knowledge among individuals in teams or groups. Therefore, EADS has implemented several methodologies for individual as well as collective knowledge transfer [see Figure 1].

3.2.1 Collective Knowledge Transfer

If knowledge has not to be transferred among peers, but among a group of people, then collective knowledge sharing has to take place.

3.2.1.1 Communities of Practice

If a topic cannot be related to a single department, inter departmental knowledge sharing is facilitated by Communities of Practice (CoPs) [see Wenger and Snyder, 2000]. According to [Brown and Duguid, 1991, p. 54], these CoPs are having a reasonable amount of autonomy and independence, in order to accelerate innovation.

After identifying the operative units' demand for communities, the KM department is providing support [also see Back et al., 2005]:

Either the initiator is organising the community him/herself, or the KM department is supporting the administrative and organisational aspects (moderation of workshops, organisation of meetings …).

3.2.1.2 Expertise compendium – Lessons learned

In order to assure continuous documentation of lessons learned, the KM department together with the operative unit develops a structure for capturing explicit specialist knowledge and lessons learned.

After defining the structure of the document, the compendium is handed over to the operative unit, which is responsible for putting in and maintaining the content.

This methodology only requires little involvement by the operative units' knowledge engineers and by the KM department and therefore is suited to continuously document and transfer insights, problems, and solutions to a large audience.

Additionally, lessons learned workshops are organised in order to allow for collective knowledge transfer of experiences.

Further means of collective knowledge sharing include expert seminars and e-learning modules with content prepared by experts.

3.2.2 Individual Knowledge Transfer

Regarding individual knowledge sharing, several methods have been developed and implemented. According to available time, work load, and kind of knowledge, a suited method has to be selected.

These methods include knowledge studies, expertise compendiums and hand-over interviews:

3.2.2.1 Knowledge studies

As a key element, knowledge studies comprise structured one-day interviews which are lead by an experienced moderator and which are recurring 5-6 times over a period of 6-12 months. During these interviews, detailed structures are being developed and filled with content describing the expertise of the leaving expert and taking context, background, and reasons for decisions into account. The methodology results in a detailed documentation (book of knowledge) available on the intranet portal "M on Air" and containing the following chapters:

General information, context, detailed elaboration of contents according to the workflow/projects/products, and vocabulary/index.

As the successor of the leaving expert is also joining the interview, transfer of implicit knowledge can take place additionally to the documentation of explicit knowledge.

Nevertheless, this methodology requires high effort by the leaving expert and has to be planned long in advance. Often, application of this methodology is not possible due to the late involvement of the knowledge management department, which may only be contacted a few weeks before an expert is leaving the operative unit.

Therefore, short term methodologies have been developed and are applied as well:

3.2.2.2 Hand-over interviews

Hand-over interviews are used to clarify specific details of selected topics in recurring interviews. These interviews (questions-answer-sessions) are used to elaborate and answer detailed questions which are based on an advanced knowledge level of the knowledge receiver.

This methodology requires medium to low effort by all participants and results in a personal transfer of knowledge between knowledge owners and knowledge receivers. Additionally, the knowledge receiver is provided with a rough structure in order to document the key issues.

Further individual knowledge transfer methodologies include structured transfer of existing data and documents as well as a programme for introducing newly hired employees called “Onboarding”.

4 Key Findings

EADS-M has realised that they are facing several typical and specific challenges regarding knowledge management and therefore has developed a set of methodologies to tackle these challenges.

4.1 Challenges and corresponding concepts

Based on the objectives and the specific challenge which is being analysed using a knowledge requirements analysis, the initial skill of the successor, existing documentation and structures, the available resources, budget, and time, the KM department is proposing a methodology. This methodology is then performed by knowledge engineers of the operative unit. Table 1 summarises the identified challenges as well as the corresponding concepts.

Challenge	Concepts to tackle the challenge
Imminent loss of knowledge due to age pattern	Knowledge studies Hand-over interviews Expertise compendium Structured transfer of data & documents Expert seminars E-learning content produced by experts
Different corporate cultures – Improvement of a knowledge sharing culture	Communities of Practice Lunch Talk (informal presentations) *KM department as enabler* *KM Marketing*
Improvement of transparency of knowledge	Knowledge requirements analysis Knowledge Portal "M on Air" *Processes and standards*
Improvement of knowledge re-use	Knowledge studies Expertise compendium Lessons learned workshops
Measure knowledge and the effect of KM methodologies	Knowledge Controlling *(development in process)*
Make KM a part of the operative units' everyday work	*KM department as enabler* *Knowledge engineers in operative units*

Table 1: Challenges and Concepts

For the final selection, several criteria have to be taken into consideration. Table 2 depicts an extract of criteria and potential methodologies. Due to the possible combination of criteria, the number of potential methodologies is reduced to the best suited concepts.

Criterion	Potential methodology
Short time to leave of expert	Hand-over interviews, Hand-over checklists, Knowledge map
Knowledge recipient already familiar with the topic	Hand-over interviews, Lessons learned workshops
Manager of operative unit prefers implicit knowledge transfer	Knowledge studies, Knowledge map, Hand-over interviews, Structured transfer of data & documents, Expert seminar
Methodology accompanied by knowledge engineer	Knowledge studies, Expertise compendium, Knowledge map
No successor available, yet.	Knowledge studies – formalised book of knowledge, Expertise compendium, Document management

Table 2: Criteria for methodology selection

4.2 Key success factors

In order to measure the success of the performed knowledge management activities, EADS-M has additionally started to develop a concept regarding "knowledge controlling". Therefore, this concept aims at assessing the effectiveness of applied activities as well as the processed knowledge. These concepts are currently being developed in order to be applied in the future.

Nevertheless, although there is no quantitative measurement yet, the KM concept of EADS-M is very comprehensive and successful and the following key success factors have been identified:

4.2.1 Top-down/Bottom-up Approach

The KM department is organised as a service provider with the objective of serving as an enabler, trainer and support for knowledge management activities within operative units and therefore closely collaborates with these units.

Accordingly, they are supporting operative units throughout the whole knowledge process by identifying "knowledge challenges", selecting methodologies, and supporting knowledge engineers, who are performing the KM activities themselves.

This way of organisation makes KM a part of the operative units' everyday work, but assures that KM is taken into consideration at all and that a central unit coordinates KM activities.

4.2.2 Comprehensive Set of Methodologies

The KM department provides operative units with a comprehensive set of methodologies, where the units are able to choose – together with the support by the KM department – the right methodology for each specific challenge.

The supported selection and application of the most suited methodology assures the best result for the given challenge, based on available resources, time, and budget.

4.2.3 Management Support & KM Marketing

Top management is actively supporting the KM initiative and communicates the importance of sharing knowledge which supports awareness shaping across the operative units.

Additionally, marketing campaigns for knowledge management and knowledge sharing activities are further improving awareness and commitment of the involved employees.

Finally, the position of a knowledge engineer – being responsible for KM activities within operative units – is actively promoted as a career opportunity.

5 Conclusions and Future Work

Although the background for knowledge management in the case of EADS-M is difficult, knowledge management has been established and successfully implemented.

The main success factors for the fast adoption and acceptance of KM initiatives are based on a mixed top-down/bottom-up approach and close collaboration of the KM department with the strategy department as well as with operative units.

Furthermore, the comprehensive set of methodologies allows EADS-M to select the suited action for each case, matching the specific requirements.

Regarding future work, EADS-M plans to continuously delegate KM activities to operative units in order to make KM a part of their everyday work. This goal is already supported by the current form of organisation, as the KM department is training employees of operative units to serve as knowledge engineers within their business units.

In order to improve retrieval within the “M on Air”-portal, semantic networks are being evaluated in order create “topic-views” and to improve topic-oriented navigation within the portal.

Finally, measuring the success of knowledge management activities (e.g. ROI investigation) is under way.

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