Aerospace knowledge management toolkit

A practical guide supporting knowledge and skills retention in the aerospace sector
STATEMENT

This Knowledge Management toolkit is created as a result of the Employer Skills Programme (ESP), a joint Government and Industry investment that, with the support of AGP Skills Working Group, aims to protect and develop key skills across the sector.

Knowledge Management can play a significant role in the protection and development of skills, for example by ensuring that critical knowledge gained from on-the-job experience is retained even when experienced people leave; or by providing the right environment for staff to find and acquire the knowledge they need to work effectively.

PREPARED BY

The document was produced following a series of workshops with participants from various Aerospace organisations (see acknowledgements on next page). The main objectives of the workshops were to:

• Involve people from a range of aerospace and defence organisations with different experience on the topic;
• Provide an immediate benefit from sharing experience within the workshops;
• Ensure that this toolkit addresses the main questions raised by practitioners;
• Collect content and guidance based on the real experience of others.

This process to run the workshops and prepare the content for this document has been completed with the assistance of Rupert Lescott and Nick Milton; respected Knowledge Management consultants from Knoco Limited.

Customer group and project steering by Alexandra Price (Knowledge Manager, GKN Aerospace), Alastair Ambroziak (Manager, THALES) and Roger Clark (Knowledge Manager, Airbus Operations Ltd). Final editorial completed by Roger Clark.
ACKNOWLEDGEMENTS

This booklet could not have been produced without the support of its funding partners, the following organisations:

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<tr>
<td>Airbus</td>
<td>Airbus is a leading aircraft manufacturer with the most modern and comprehensive family of airliners on the market, ranging in capacity from 100 to more than 500 seats. Airbus champions innovative technologies and offers some of the world’s most fuel efficient and quiet aircraft. Airbus has sold over 16,200 aircraft to more than 360 customers worldwide. Airbus has achieved more than 9,400 deliveries since the first Airbus aircraft entered into service. Headquartered in Toulouse, France.</td>
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- Other participating or contributing organisations
  - BAE Systems
  - Boeing
  - Bombardier
  - Fokker
  - Hycrome Ltd
  - NASA
  - Northrop Grumman
  - QinetiQ
  - Rolls-Royce PLC.

This project has been partly supported by HM Government with Employer Ownership funding.
FOREWORD FROM SPONSOR

The Aerospace Growth Partnership (AGP) is a collaboration of Industry and Government working together to secure the future of UK aerospace. It has created a shared vision and plan for the UK aerospace sector to address the market failures that have created barriers to growth. It is inclusive of all aerospace companies with a presence in the UK.

The AGP has launched the Aerospace Industrial Strategy, Lifting Off, 2013, (https://www.adsgroup.org.uk/pages/40227907.asp) which defines the long-term vision for the UK’s position within the global marketplace. With Over 32,000 new passenger and freighter aircraft are set to be built over the next 20 years, at a market value of nearly $5trillion, the opportunities for the UK are considerable. If the UK can grow it’s global market share by even 1%, it will generate tens of billions of pounds in additional exports and will create thousands of new jobs for the nation.

The skills shortage obstacle is a result of the aerospace sector’s failure to train and retain employees with the right skills. If the sector does not get better at developing skills it will fail to realise the full potential of its growth ambition. Furthermore, the sector now faces a double-edged sword: a large portion of its skilled workforce is nearing retirement age while the dramatic market growth means the sector will need to grow its workforce by 20% in the next 10 years.

Knowledge Management has been identified as focus area because there are many examples of an individual within a company who holds more information and know-how than their immediate colleagues. This knowledge can be lost when these individuals retire or leave the industry, and these individuals therefore represent single points of failure. Effective knowledge management grows more important when over 8,000 people could retire from the UK aerospace sector and we need to ensure their skills, expertise and knowledge is not lost to the sector and more importantly the firms in which they are employed.

The ever-increasing complexity of aerospace products and advancements in new technology can create challenges in terms of the time it takes new employees to acquire the necessary expertise, become productive and add value. This is an issue not only for Engineering but the whole organisation.

By introducing a culture and a mindset of effective knowledge management and best practice development across the sector, the aerospace industry can benefit from:

- Accelerated Learning – Allowing new staff and developing experts to participate in knowledge transfer, allowing them to have a quicker and better understanding of their new sector.
- Mitigate and Reduced risk – By identifying sector critical knowledge to be supported by new networks of expertise, it will be possible to improve resilience to knowledge loss. The resulting benefit is fewer single point failures when people leaving an organisation take critical knowledge with them.
- Improved Performance and Productivity – Knowledge sharing driven by the networks that the Industrial Partnership will put in place will promote learning from experience across the sector. Better awareness across the sector permits more informed decisions following best practice and avoiding past mistakes. This project expects to reduce repeated errors, improve product reliability and increase customer satisfaction.
- Managing Long Product Life-Cycles – With product life cycles spreading decades, companies cannot always rely on experts to learn from one programme and feed their experiences back into the next. Knowledge Management can support long-term knowledge retention by formalising the knowledge, establishing integrated ‘Lessons Learnt’ processes and capturing knowledge through training schemes.
I therefore strongly encourage all UK Aerospace organisations to take advantage of the tools and guidance set out on this toolkit for knowledge retention not only in their own organisation but on behalf of the sector as a whole.

Mark Stewart
General Manager & HR Director, Airbus Operations Ltd.
Chair AGP Skills Working Group
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How to use this Toolkit

DISCLAIMER
The material contained in this toolkit constitutes general guidance only and does not represent advice on any particular matter. No reader/purchaser should act on the basis of this material without first taking professional advice appropriate to their specific circumstances.

ACCESSING CONTENT
Chapter structure: Each chapter covers a major theme or activity of Knowledge Management and is broken into the following sections:

- **Overview**: an introduction to the theme activity area and its importance with reference to Aerospace.

- **Questions answered**: a guide to the type of content in the chapter and the most relevant section to answer your question.

- **Tools**: the tools that could be relevant and applied, they range from simple tools to the more complex and are described in easy to follow headings:
  - What is this tool?
  - Deliverables and benefits
  - Who is involved?
  - When should it be used?
  - Method
  - Tips
  - Examples
  - ‘You know it’s working when…’

- **Success Factors**: a series of considerations for planning, enablers and constraints that are relevant to the theme and the tools discussed.

- **KPIs**: a set of relevant measures that can be employed.

- **References**: a set of references and or further reading in case.

- **Linking of content**: There are many overlaps and links between the different chapter areas and these are linked using hyperlinks shown in underlined text.

- **Materials and resources**: useful templates that could help you to implement a tool in your business are attached in the appendices and linked from the relevant tool.
What is Knowledge Management and why do it?

Overview

Knowledge Management (KM) has been practiced for over 20 years in all business and public sector organisations. Despite its established history KM can still be a ‘fuzzy’ concept and many people remain unsure of its purpose and what it involves. This chapter will explain what KM is and how it can help aerospace companies improve performance in circumstances such as:

- Experts as single points of failure – business-critical knowledge may be held in the heads of a few experts and not available elsewhere;
- Ageing workforce – many engineers are in their final 10 years of employment and companies need to prepare to retain the 30 years of knowledge each of them has gained;
- Export controls – the International Traffic in Arms Regulations (ITAR) place particular constraints upon aerospace companies sharing information across national borders;
- Employment market realities – the aerospace industry requires skills where competence takes investment of many years to achieve, today’s younger workforce no longer seeks a ‘job for life’;
- Standards – aerospace companies face an increased use of knowledge-intensive technologies such as composite materials whilst maintaining quality standards and meeting airworthiness requirements;
- Product lifecycle Knowledge Management – design knowledge and rationale from the design phase must be kept and maintained through decades of service.

The chapter will also help readers to ‘make the case’ for KM – further information on KM Strategy and implementation is given in the chapter on Implementing Knowledge Management.
QUESTIONS ANSWERED IN THIS CHAPTER

- What is knowledge?
- What is Knowledge Management (KM)?
- Why do KM?
- How do we model KM?
- How do we balance access and security?
- Why is KM important in the aerospace industry?
- Is KM internal or external or both?
- What is the difference between KM and Organisational Learning?
- How much should we invest in KM?
- How do I sell/present KM to the business?
- Can we do KM on our own?
- How can I combine KM with other disciplines?
- How do we monitor and evaluate KM?
- What do different stakeholders want from, and offer to, KM?
- How do we prioritise KM activities?
- How do we communicate about KM?
- How do you know if your knowledge is obsolete?
DESCRIBING KNOWLEDGE MANAGEMENT

Definitions

- **Knowledge:**
  - acquaintance with facts, truths, methodologies or principles, as from study or investigation;
  - implies an ability to decide, based on insights and wisdom accumulated through experience.

- **Types of knowledge:**
  - **Tacit:** held in people’s heads and not fully defined; often hard to do so;
  - **Implicit:** knowledge which can be more easily expressed and codified;
  - **Explicit/Codified:** written down or otherwise recorded (i.e. on audio, video etc.);
  - **Individual knowledge:** knowledge held by a single individual;
  - **Collective knowledge:** knowledge shared among a group, team or network of people.

- **Knowledge Management:**
  - seeks to capture, use, share and retain knowledge for the good of the wider organisation and its customers;
  - views knowledge as an (albeit intangible) asset, just as money, people and property are assets to be valued and managed with care;
  - “It is the attempt to recognise what is essentially a human asset buried in the minds of individuals, and leverage it into a corporate asset that can be used by a broader set of individuals, on whose decisions the firm depends.” (Larry Prusak, IBM).

Knowledge Management is not the same as:
- document or data management;
- business intelligence;
- information management (though information and KM overlap in so far as codified knowledge is managed by both disciplines).

The diagram below represents the link between knowledge, data and information:

- **Generating competitive advantage through applied reasoning**
- **Transforming information through comparisons, conversation and by making connections**
- **Adding meaning through contextualisation and categorisation**

- **Wisdom**
- **Competence**
- **Knowledge**
- **Information**
- **Data**

- **Understanding relationships**
- **Understanding patterns**
- **Understanding principles and applying judgement**
Analogies

A few analogies can help explain KM and its similarities to other disciplines. Note: no analogy is perfect!

• Money – many things that can and should be done with money can and should also be done with Knowledge Management. For example:
  – We can earn money – this translates to acquiring new knowledge, either from new hires or innovating;
  – We can save money – this means writing things down and not letting knowledge sit in only a few heads;
  – We can invest money – this equates to transferring specific knowledge to those that can make the most of it, when its most relevant;
  – Unfortunately, we can also waste money – this would be like disbanding a project team without asking them what they learned for next time.

• Water – Like water knowledge can flow and accumulate, for example knowledge:
  – Has different forms, constantly changing and evolving; the more you try to pin it down the more it slips away;
  – Does not belong to anyone – used by everybody, organisations need knowledge to flow freely and strongly in order to spread learning; it does not disappear with use, just takes another form;
  – Flows can create energy, but without circulation, becomes stagnant;
  – Flows can be controlled, or funneled, and knowledge can be stored and released when needed.

The different forms of water can be a metaphor for knowledge.
**KM Models**

There have been many attempts to represent KM through models. One of the first is the 1995 ‘SECI’ model from Japanese academics, Nonaka and Takeuchi, which identifies 4 elements of knowledge flow:

**Nonaka’s SECI model**

Knowledge Management seeks to capture, use, share and retain knowledge for the good of the wider organisation and its customers.
**KM as a System of Processes and Activities**

KM can also be described by a series of processes and activities that together form a system for managing knowledge. This toolkit has been organised as a series of KM process sets, activities and tools as per the list below.

- **Learning from projects** e.g.
  - After Action Reviews;
  - Lessons capture, analysis and management;
  - Peer Assists.

- **Retaining critical knowledge** e.g.
  - Knowledge scanning and mapping;
  - Knowledge transfer programmes.

- **Building best practice** e.g.
  - Knowledge assets (formal and informal).

- **Enabling collaboration** e.g.
  - Communities of Practice (CoP) and professional networks;
  - Social media.

- **Finding and structuring knowledge** e.g.
  - People-finder software and ‘Yellow Pages’;
  - Taxonomies.

This is shown diagrammatically below as lifecycle of activities for managing knowledge and the relationship to each main theme of this toolkit:
MAKING THE CASE FOR KNOWLEDGE MANAGEMENT

Business Case

In some organisations, KM has been endorsed from senior management from the outset. In other cases it is adopted somewhere in middle management and a business case needs to be made for its wider adoption. This business case will include the following elements:

- Business drivers – what are the business ‘pain points’ for which KM provides a solution?
- Benefits – what benefits are expected to be achieved through KM? (see below for examples)
- Financial metrics – what investment will be made? What return on investment (ROI) is expected? By when?
- Risks and Opportunities – what are the risks of adopting KM? How can these be managed?

Benefits

KM can solve many different problems and bring about many benefits to aerospace businesses:

- **Accelerated Learning** – people can obtain knowledge they need more quickly and safely than learning through trial and error;
- **Improved Performance** – people learn to do things better and more efficiently by acting on previous experience;
- **Reduced risk** – people can mitigate and anticipate problems that they may otherwise be unaware of;
- **Improved Innovation** – people can create and share new knowledge and different ways to solve problems.

This could in turn result in:

- Faster or more effective product development;
- Maintaining product knowledge over the lifespan of an aircraft, despite personnel turnover, thus delivering better quality service and maintenance;
- Maintaining technical knowledge despite the retirement of experts, thus maintaining corporate capability.

A KM business case could focus on reduced cost and time and fewer delay penalties, or on reducing risk, cost and errors that occur as a result of knowledge loss. One challenge in making the case for KM is the difficulty of measuring tangible benefits. This toolkit provides advice throughout on possible metrics and KPIs.

Key Performance Indicators (KPIs)

Having identified the expected benefits that KM will bring, KPIs will help track progress. Metrics include maturity, activity and impact metrics, as shown below:

- **Activity metrics:**
  - Number of lessons capture meetings;
  - Number of Knowledge retention interviews;
  - Number of Peer Assists;
  - Read rates for knowledge articles;
  - Community of Practice queries;
  - Number of people signed up to and using KM resources.

- **Maturity metrics:**
  - Maturity or completeness of the knowledge management system or framework;
  - Maturity of communities of practice.

- **Impact metrics:**
  - Reduction in time for design tasks;
  - Improved delivery times;
  - Improved service record.

Each of the following chapters will contain metrics to measure activity, maturity and impact for each specific KM area.

“Elevator Pitch”

An official argument to adopt KM comes in the form of a business case, but informal approaches can also help. For example, an ‘elevator pitch’ (a short summary used to quickly and simply define the value of something in the time of an elevator ride) might help explain KM to someone unconvinced of its benefits. Some ideas below are presented for inspiration:
• Two heads are better than one.
• Imagine one of your colleagues won the lottery and didn’t come back to work, what effect would that have? Who else knows how to do the things that he/she knew how to do?
• Isn’t it better to learn from other people’s mistakes than make your own?
• Someone, somewhere, has done this before – now where are they and can they help me?
• Our biggest asset is our million man-years of experience. We should manage that asset.
• Learning before, during and after leads to performing better, cheaper, faster and safer.

• None of us knows what we all know. If we all knew what we all know, we would be unbeatable.
• KM means taking what is in people’s heads, and using this as a corporate resource.

**TOP TIP**

When people think about implementing KM, they’ll start thinking about the solution first. Yet the piece of thinking required is “What knowledge do we need to manage?”

What knowledge do we need to flow around the organisation? What’s the high value knowledge and know-how? What’s the knowledge that will give the company a competitive edge?

Focus KM on the topics of highest business value, then your implementation will be easier and deliver greater benefits. You can call these topics of highest business value, “strategic knowledge areas.”

Your KM business case and strategy should identify the strategic knowledge areas and use them as focus points.

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**KM Stakeholders**

Different people from within the business will have a different perspective of what KM is for and how it will benefit the organisation. Even if people are supportive of KM then they may have a different idea what the objectives are and so there may well be work required to ensure a level of alignment. The following table can illustrate the different viewpoints that may exist:

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<thead>
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<th>Knowledge Management School</th>
<th>Assumption/Philosophy</th>
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<td>Organisational learning</td>
<td>If only the learning processes were right then...</td>
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<tr>
<td>HR</td>
<td>If only people had the right skills then...</td>
</tr>
<tr>
<td>Business process</td>
<td>If only the process was correctly defined and followed then...</td>
</tr>
<tr>
<td>Information technology</td>
<td>If only people had the right information then...</td>
</tr>
<tr>
<td>Organisational development</td>
<td>If only we had the right culture then...</td>
</tr>
<tr>
<td>Information science</td>
<td>If only people used the corporate taxonomy properly then...</td>
</tr>
<tr>
<td>Innovation</td>
<td>If only we exploited all our new ideas then...</td>
</tr>
<tr>
<td>Social networking</td>
<td>If only everyone knew each other then...</td>
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Retaining Critical Knowledge

Overview

In an industry dependent on highly-technical knowledge, the risk of losing knowledge through losing experts is one that Aerospace needs to manage, not least because of the time and cost of re-acquiring it. Knowledge can be lost through the retirement of the expert, their move to a different external or internal role or through other factors such as long term illness. This chapter will look at how organisations identify and map the risk of knowledge loss, prioritise knowledge to be retained and then plan to transfer that knowledge to the organisation.

Note

The terms ‘skills’ and ‘competences’ are sometimes used almost interchangeably with ‘knowledge’. Knowledge Management is not meant to replace skills/competence processes intended to close competence gaps. However there is usually a strong relationship between the knowledge people have and the competence they can demonstrate. (The diagram on the right suggests such a relationship).

Generally speaking competence/skills initiatives will focus on ‘mature’ knowledge areas i.e. well-defined and ‘collective’ learning needs that are required by multiple learners. Knowledge Management compliments skills training, by supplying knowledge on demand and by addressing less mature knowledge that cannot easily be delivered through training.

Note that in this chapter we focus on technical means to retain knowledge through identifying, capturing and transferring it. We do not cover approaches to retention of staff, such as pay and benefits and employee engagement which can also be contributory factors for staff (and thus knowledge) retention.

Relevant Keywords

- Asset
- Audit
- Capture
- Conservation
- Critical knowledge
- Diagnosis
- Interview
- Mapping
- Prioritisation
- Retention
- Retirement
- Risk
- Scan
- Transfer
QUESTIONS ANSWERED IN THIS CHAPTER

- What are the differences between skills, competences and knowledge?
- A specialist is retiring next year – how do I avoid losing their knowledge?
- How do we overcome barriers to retaining knowledge?
- How do I identify critical skills and single points of failure?
- How do we refresh or challenge the knowledge we have?
- How do you ensure knowledge transfer during succession planning?
- Is training enough to transfer knowledge?
- How can I prevent experts becoming bottlenecks?

TOOLS INCLUDED IN THIS CHAPTER

The tools within this chapter fall into two types:

- **People-Centric Risk Assessment**
  an analysis of individuals who represent the greatest risk of loss of critical knowledge.
- **Knowledge-Centric Risk Assessment**
  determines the level of knowledge per knowledge topic and the level of risk of knowledge loss.
- Variation: **Knowledge/Skills Matrix**.

- **Knowledge Transfer Plan**
  defines a series of tasks to efficiently transfer (or capture) critical knowledge from one person to another.
- **Knowledge Capture Interview**
  a structured approach for identifying, capturing and documenting knowledge from an individual, so it can be re-used by others.
- Variations: **Photo/Video Capture, Expert Masterclass** and **Audience with an Expert**.

1. Risk or gap identification:
   Tools for recognising and mapping the risk of knowledge loss.

2. Risk mitigation or gap closure:
   Tools for knowledge capture and transfer.
Also known as Attrition Risk Mapping, Retention Risk Analysis.

What is this tool?
Attrition risk mapping is an analysis of individuals within the organisation, in order to identify those who represent the greatest risk of loss of critical knowledge.

Deliverables and benefits
Attrition risk mapping allows knowledge retention activity to be prioritised, by identifying individuals who represent the greatest and most urgent risk of knowledge loss. Attrition risk mapping can be a regular activity as part of the HR cycle, allowing knowledge retention and transfer to be planned several years ahead of the individual's retirement or planned departure (if known).

Who is involved?
HR – the long-term planning of retention activities is an HR exercise and HR needs to build the list of imminent retirees or potential leavers.
Management – as part of their regular conversations with HR, management can indicate which of these retirees holds the most critical knowledge.
KM team – KM team needs to be involved, as they will conduct or support elements of knowledge retention and transfer activity.

When should it be used?
On a regular basis, ideally annually, in any organisation with a significant population of ageing staff.
Method

HR will generate relevant data for all staff over a certain age (e.g. 45 or older) and identify the probability of leaving e.g. retirement, promotion, internal or external job moves etc. They create a spreadsheet to calculate attrition risk, based on two factors.

1. The first factor is the *imminence of departure*. For example this may be characterised as follows:
   - Retirement in less than 2 years – retirement risk 5
   - Retirement in 2-3 years – retirement risk 4
   - Retirement in 3-4 years – retirement risk 3
   - Retirement in 4-5 years – retirement risk 2
   - Retirement in more than 5 years – retirement risk 1

2. HR and management then discuss each individual with a leaving or retirement risk of greater than 1, in order to determine a *knowledge risk factor*. This number is between 1 and 5, and each level is described as follows:

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<th>Knowledge Risk Factor</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Critical and unique knowledge and skills. Mission-critical knowledge with the potential for significant reliability or safety impacts. Company-specific knowledge. Knowledge undocumented. Would take 3 or more years training and experience. No ready replacements available.</td>
</tr>
<tr>
<td>4</td>
<td>Critical knowledge and skills. Mission critical knowledge. Some limited documentation exists, and some limited duplication of knowledge. Requires 2 years of training and experience.</td>
</tr>
<tr>
<td>3</td>
<td>Important systematised knowledge and skills. Documentation exists, and other people have this knowledge. Recruits are available and can be trained in a year.</td>
</tr>
<tr>
<td>2</td>
<td>Proceduralised or non-critical knowledge and skills. Clear up to date procedures exist. Training programs are current and effective and can be completed in less than a year.</td>
</tr>
<tr>
<td>1</td>
<td>Common knowledge and skills. External staff with this knowledge can be easily hired and need little extra training.</td>
</tr>
</tbody>
</table>

Some examples of what may be considered important or critical knowledge are given in the Appendix – see *Appendix 6 – What could be important knowledge?*

The retirement risk and the knowledge risk for each individual are multiplied to create a combined figure – the total attrition risk factor. All individuals with a total attrition risk of 20 or greater are prioritised for development of a *Knowledge Transfer Plan*.

**TIPS**

Build attrition risk mapping into the annual HR cycle, to make it a routine procedure.

Note that a ‘people-centric’ approach to risk assessment may yield different results to a ‘knowledge-centric’ approach since there could be many people contributing to a particular knowledge topic which may reduce the risk of a single person leaving – see *Knowledge-Centric Risk Assessment*. 
Example

During a reorganisation effort, one company found that 44 employees critical to the company’s success were likely to leave.

*Risk heat map for European industrial company, figures indicate number of employees in category (total = 497)*

<table>
<thead>
<tr>
<th>Difficulty in replacing this person</th>
<th>Low risk</th>
<th>Medium risk</th>
<th>High risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unique skills/knowledge: a pivotal person in the organisation</td>
<td>37</td>
<td>22</td>
<td>9</td>
</tr>
<tr>
<td>Important resource whose specific skills/knowledge require careful attention</td>
<td>69</td>
<td>50</td>
<td>39</td>
</tr>
<tr>
<td>Important resource, but person’s competencies are shared and not at risk</td>
<td>74</td>
<td>28</td>
<td>21</td>
</tr>
<tr>
<td>General competencies in own area</td>
<td>10</td>
<td>22</td>
<td>6</td>
</tr>
<tr>
<td>No specific competencies: easy to find in the market</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>0</td>
<td>25</td>
<td>50</td>
<td>75</td>
</tr>
</tbody>
</table>

*Probability of person leaving organisation, %*

Based on market demand for employee’s skills, latest salary trends, existing competitive offers, family situation and known preferences and concerns.

Example: the results of attrition risk mapping from McKinsey, using a similar process to the one described here.

You know it’s working when…’

Knowledge retention exercises are planned 2 or more years ahead of time, rather than at the last minute.

TOP TIP

Attrition risk mapping can be linked to various HR initiatives, such as the definition of critical capability. If there are few people covering a critical capability and they are due to retire soon then the attrition risk mapping will highlight this as an area where knowledge retention and transfer are needed.
Also known as Knowledge Scan, Knowledge Audit, Knowledge Diagnosis.

What is this tool?
This risk assessment or ‘Knowledge Scan’ is an enabling activity to determine the level of management of knowledge on that topic and the level of risk of knowledge loss. Discrete knowledge areas are defined, characterised and then prioritised for further action. Such follow-on actions might include a Knowledge Retention and Transfer programme, Knowledge Capture or the development of Communities of Practice.

Deliverables and benefits
A knowledge scan will provide an insight into the level of management of knowledge topics and identifies the topics that require most urgent attention.

Who is involved?
**Interviewer** – if the scan is being done through interviews, an experienced interviewer will be needed.
**Facilitator** – if the scan is being done through one or a series of workshops, a facilitator will be required to enable honest discussion, maintain focus and record/write-up.
**Process owners, knowledge holders** – in either the interview or the workshop-based scan, these people are the subject matter experts who will be asked to describe the individual knowledge topics.

When should it be used?
Normally a Knowledge scan is conducted in order to prioritise knowledge topics for attention and intervention. Where possible, scans should be conducted annually in order to maintain an up-to-date assessment of the organisation.

Example
**Deliverable** – a list of knowledge topics, ranked by importance according to the scores awarded by workshop or interview participants. Various scores can be used to determine particular risks. For example, a topic is high retention risk if the current criticality of the knowledge is high, the risk of expert loss is high and the replicability is low. The three scores can be combined to give an overall risk. An example is shown below:

In this example shown above, the scoring suggests that ‘Coatings selection and application’ is the knowledge topic at greatest risk, which implies that knowledge retention work should begin here. The results can be subjective and informed decisions should only be made through a combination of using data derived from interviews and applying a sense-check.

<table>
<thead>
<tr>
<th>Knowledge topic</th>
<th>Retention risk score (/100)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coatings selection and application</td>
<td>86</td>
</tr>
<tr>
<td>Requirements capture</td>
<td>73</td>
</tr>
<tr>
<td>Systems integration testing</td>
<td>54</td>
</tr>
<tr>
<td>Cathode installation and testing</td>
<td>47</td>
</tr>
<tr>
<td>Etc...</td>
<td>...</td>
</tr>
</tbody>
</table>

**TIPS**
Prior to any workshop create a Knowledge Map of topics to ensure that people can align on the relevant scope and level of the knowledge under consideration.
Method

The following guidance is generic and can be adapted to suit either the interview or workshop method.

**Identify knowledge topics.** Where an organisational taxonomy already exists (e.g. ATA chapters), or a listing of organisational capabilities for example in a skills matrix (see below), this should be used as the basis of knowledge topic definition. Alternatively ask each process (or product) owner to create a high level list of the main knowledge topics of importance. These should be “how to” topics, such as:

- “How to procure materials”;
- “How to design a composite component”, or
- “How to market to major airlines”.

Note this could also be done through a high level Knowledge Mapping.

**Rank knowledge topics.** Rank the topics by assigning numerical values (or high/medium/low) according to some or all the following criteria listed below:

| Importance | • Now – how important is this knowledge topic to company success at the moment? (see Appendix 6 – What could be important knowledge?)
|            | • 3-5 yrs. – how important is this knowledge topic to company success in the near future (3-5 years)?
| Documentation Level | • How well documented is the know-how associated with this topic?
| Knowledge Spread | • Now – how dispersed is the knowledge of this topic within the company (e.g. is it held by one small team, or by a widespread community in all parts of the business)?
|               | • 3-5 years – how dispersed does this knowledge need to be in the near future?
| Maturity Level | • How mature is this knowledge (from brand new, to fully mature and well established)?
| Level of in-house Knowledge | • Now – How much does the company know about this topic at the moment (i.e. from “we are global experts” to “we know nothing”?)
|               | • 3-5 yrs. – How much does the company need to know about this topic in the near future?
| Replicability | • How easy will this knowledge be to replace/recover if we lose it (e.g. can we buy it off the shelf)?
|               | • How long would it take someone new to gain this knowledge?
| Risk of Knowledge Loss | • How high is the risk of losing the relevant experts?
|               | • How many other people have the knowledge?
| Re-Use | • How often is this knowledge likely to be required and who will benefit from it next?

**You know it’s working when…’**

Knowledge Management tools, including retention and transfer, are applied systematically to the most critical and at-risk topics.
What is this tool?
Applied at team or function level, a knowledge/skills matrix is a tool to identify and record employee proficiency levels in the various competencies required for their role. Such a matrix is normally completed at a finer level of granularity than typical job competency assessments that are sometimes organised by companies as part of annual performance and development processes.

Key differences
• A team knowledge/skills matrix should be generated when it is unclear whether there is sufficient ‘strength in depth’ in certain knowledge areas or to create a clearer view of the team’s collective knowledge level.
• The matrix helps managers to identify knowledge/skills gaps and can assist in ensuring sufficient coverage across a team or department. The matrix may also help identify succession planning opportunities.
• For an individual, it can be completed once an employee takes up a new role. It should then be reviewed and updated on a regular basis to reflect the employee’s increased proficiency in skills that they already possess and also their acquisition of new ones.

TOP TIP
If your organisation already has identified a set of critical knowledge topics, such as for example a technical competency list, then conduct a scan against these competencies. Although HR performance and development functions will map individuals against the competencies, a Knowledge Scan takes an organisational view of how well the topic is documented, how well diffused the knowledge is, what the risk of loss is etc. Actions to address the management of the topic knowledge can be combined with more individual-focused training plans and career development.
Also known as Handover, Expertise Transfer.

What is this tool?
The Knowledge Transfer Plan defines a series of tasks to efficiently transfer critical knowledge from one person to another (often with a component of knowledge capture). Once an individual has been identified for knowledge retention activities, the next step is to develop a Knowledge Transfer Plan.

Deliverables and benefits
A Knowledge Transfer plan ensures the right methods are used to transfer and/or capture specific knowledge from an individual. It also allows the progress of knowledge retention and transfer to be monitored and reported to management.

Who is involved?
- Knowledge holder – the person who holds the knowledge which needs to be retained and transferred (sometimes known as the ‘giver’).
- Facilitator – someone from the KM team.
- Successor(s) – the person or persons who may need the knowledge – if available (sometimes known as the ‘receiver’).
- Manager – the individual’s manager needs to sign off on the plan.

When should it be used?
A Knowledge Transfer plan should be applied whenever an individual has been identified as a subject for Knowledge retention. It is good practice to obtain agreement from the knowledge holder to participate in advance.

Method
The methodology is based around a knowledge transfer planning workshop, which will take 2-3 hours and involve the people listed above. The output from the workshop is a completed Knowledge Transfer Plan template:

- The KM representative should explain that HR and management have identified the individual as having knowledge critical to the organisation and want to capture and transfer this knowledge to reduce the risk associated with knowledge loss. This will require creating and following a Knowledge Transfer Plan.

- Create a personalised Knowledge Map of the knowledge holders’ knowledge (see tips box) and identify the most important and critical knowledge topics to be transferred.

- The KM representative notes these down on the Knowledge Transfer Plan template. Each of these Knowledge Topics is given a priority – H/M/L

- Starting with the highest priority knowledge, discussion follows on what actions are needed to retain and/or transfer that knowledge. A series of possible action is provided in the KT planning worksheet (see tips box). Guidance may be needed from the KM representative at this stage, along with agreement on where any documented knowledge is to be stored.

- Finally, the individual’s manager needs to sign off on the plan, to ensure that the individual is given the time and space to conduct the activities in it.
Example

An example of a Knowledge Transfer Plan with illustrative content is shown below, a blank template is also provided in the Appendices:

<table>
<thead>
<tr>
<th>Employee Knowledge Transfer Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Employee</strong></td>
</tr>
<tr>
<td>Joe Bloggs</td>
</tr>
</tbody>
</table>

Summary and situation assessment

(Summarise the knowledge held by the employee and what makes his position special).

Joe Bloggs has been the lead design engineer for the B-290 aircraft for over 4 years; within the company, he is considered a single point of contact for all interface issues. Additionally, he has built up an industry-wide reputation as a pioneer and has spoken at numerous international conferences, as well as making several media appearances.

<table>
<thead>
<tr>
<th>Knowledge Area</th>
<th>Priority (H/M/L)</th>
<th>Transfer Action</th>
<th>Target date</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Widget and sprocket interfaces</td>
<td>H</td>
<td>Retention interviews with KM team (and relevant new-joiners); Update of Interface Knowledge Asset.</td>
<td>Nov-16</td>
<td>Two interviews conducted; 1 more scheduled. One interview written up on Knowledge Asset in draft form; 2nd interview yet to be written up.</td>
</tr>
<tr>
<td>Design Project Planning</td>
<td>M</td>
<td>Retention interviews to cover this also; Available for Peer Assist on new project X when required.</td>
<td>Mar-17</td>
<td>Peer assist scheduled for Oct-17.</td>
</tr>
</tbody>
</table>

You know it’s working when…’

Knowledge Management tools, including retention and transfer, are applied systematically to the most critical and at-risk topics.
Suitable knowledge capture and transfer actions to go in the plan may include the following:

- **Identify or develop replacement**
  - External appointment
  - Current employee

- **Create classroom training material**
  - Formal instruction
  - Class exercise
  - Business Game

- **Transfer knowledge on the job**
  - Shadowing/ coaching
  - Dedicated learning
  - Paired Mentoring

- **Creation of e-learning**
  - Full e-learning class
  - Other

- **Find alternative resource**
  - Contract out
  - Transfer responsibility to another manager

- **Eliminate the need**
  - Re-engineer process
  - Eliminate department

- **Document and codify**
  - Hold knowledge capture interview
  - Hold lessons learnt / best practice meeting
  - Update procedures and guidance
  - Collate documentation (knowledge asset)
  - Narrate work – for example in video

- **Transfer to others**
  - Hold knowledge transfer interview
  - Host an “Audience with …”
**TRANSFER CHECKLIST**

Variation on a Knowledge Transfer Plan

**What is this tool?**

When the knowledge is not critical, transfer to a successor can be helped by the use of a checklist that the leaver completes. An example is shown in Appendix 3 – Community launch and development checklist.

**Key differences**

- A checklist is more superficial than a Knowledge Transfer Plan and generally involves only the leaver documenting their own knowledge, usually in a few sentences. The checklist may be accompanied by a handover meeting but again these are usually short – at most a few hours. For more critical knowledge a Knowledge Transfer Plan and a long period of interviewing, coaching, demonstrating and capturing videos is needed.

- The checklist is generally used from transfer from one leaver to one successor; it does not leave a documented record.

**TOP TIP**

Prior to any workshop create a personalised Knowledge Map of topics to ensure that people can align on the relevant level of the knowledge under consideration.

The diagram above is from Airbus showing the starting point for creating a personalised knowledge map as used in their Expertise Transfer (ExTra) process.
Retaining Critical Knowledge

Also known as Knowledge Harvesting Interview, Knowledge Acquisition, Knowledge Elicitation, KAMP (Knowledge Acquisition & Modelling Process).

What is this tool?
A structured approach for identifying, capturing and documenting knowledge from an individual, so it can be re-used by others. In this context, interviewing is a form of dialogue: a question/answer process which continues until the interviewer reaches core knowledge. An interview is one of the most effective ways to capture and document the knowledge from an individual.

Deliverables and benefits
Knowledge capture interviews can deliver a tremendous wealth of material to build into a corporate Knowledge Asset for the organisation (for further details, Building Best Practice). The advantage is that once documented this knowledge can be shared more widely or built upon by others and used as an informal training resource.

When should it be used?
Most commonly as part of a defined Knowledge Retention program, when the plan specifies knowledge capture on a specific topic. However interviews can also be conducted if the interviewee has gained specific experience which needs to be captured and shared or has become an expert with knowledge from which others can benefit.

Who is involved?
Knowledge holder: the person who holds the knowledge which needs to be retained and transferred (sometimes known as the ‘giver’); Receiver(s) or Successor(s): the person or persons who may need the knowledge - if available (sometimes known as the ‘receiver’); Manager: the individual’s manager needs to sign off on the plan; Interviewer: an independent facilitator (i.e. a knowledge engineer or KM specialist, or a successor to the giver who has been trained in knowledge elicitation techniques) who will conduct the interview and may also help in the packaging of knowledge outputs; Peers: sometimes it can be beneficial to involve experienced colleagues that can both benefit from the knowledge shared and ask more difficult questions.

Method
Note that a number of sessions may be needed/planned to cover one or more knowledge topics and it may be important to space these out to allow them to follow the cycle below:

Preparation: Before the interview, the interviewer canvasses the interviewee, their manager, and their colleagues to determine what topics to cover in the interview. Ask the interviewer “what topics should I ask you about, where it is important to pass your knowledge on to your successor”. Circulate questions in advance in the form of a Knowledge Interview Session Plan – see template.

Interviewing: Usually a semi-structured interview approach, this means that the most important questions are pre-planned but allowing for supplementary questions for deeper enquiry where time allows. Ensure that sufficient notes are taken in case of the failure of any audio recordings failure.

Post-Interview: It is normally the job of the interviewer (knowledge engineer) to create a summary of the session using notes and referring to any recording. This would include recreating any diagrams or images and inserting references. The output can be used as a stand-alone reference or incorporated to a larger Knowledge Asset (for example a set of wiki pages). Depending on the governance model, some validation of the content may be needed before publication communicated to its intended audience, such as a Community of Practice or network.
Example

The NASA U.S. Spacesuit Knowledge Capture (KC) program has existed since the beginning of 2008 and was designed to retain and transfer historical spacesuit knowledge to engineers and other technical team members to augment their understanding of the spacesuit, its evolution, its limitations and its capabilities.

Many subject-matter experts have been interviewed, provided lectures, to help bring the spacesuit to life and to ensure lessons learnt will never be lost. The U.S. Spacesuit KC topics have included lessons learnt from some of the most prominent spacesuit experts and spacesuit users including current and former astronauts.

The events have enriched the spacesuit legacy knowledge from Gemini, Apollo, Skylab, Space Shuttle, and International Space Station programs. Expert engineers and scientists have shared their challenges and successes to be remembered. During the program’s existence more than 65 seminars have captured spacesuit history and knowledge.

“You know it’s working when...’

- The Knowledge Assets populated from interviews such as these gradually becomes a ‘go to’ resource for people and communities planning new pieces of work and/or research;
- Experts and/or people approaching departure (including retirement) come to expect interviews before they leave, rather than being surprised and feeling inconvenienced by them;
- The need for calling departed employees back in and/or hiring people for specific knowledge reduces over time.
**What is this tool?**

Recording a knowledge retention interview, a presentation or narrated work on video, for later viewing.

**Key differences**

- The main objective is to create a video recording rather than a published text. This is particularly relevant for communicating physical tasks and methods that are not easily described by text.
- For example, Airbus has piloted the use of video recording methods to document some infrequent systems installation tasks.
- Some companies have also used photographic capture of manufacturing or maintenance tasks to help illustrate them for less experienced staff.
- Note that some software tools exist that facilitate the later search and retrieval of specific content from within a video since ordinarily videos cannot be easily browsed and searched like text can.

---

**What is this tool?**

An Expert Masterclass is a focused event, planned when expert knowledge needs to be transferred or captured in a short space of time.

**Key differences**

- A masterclass differs from a Knowledge Capture Interview in that it is usually a one-off event aimed at maximising the amount of knowledge captured in one shot.
- A typical format may be a half-day event with a panel of 3-4 experienced colleagues who will pose the questions. Typically, the topics are agreed in advance, and the Expert may prepare material.
- The masterclass can be video recorded for later reference.

---

**What is this tool?**

This is a public, interactive interview with an expert, held in front of an audience of peers and colleagues, in order to share knowledge and stories. This could be combined with a standard interview later, but the purpose of the audience is to engage the peers and colleagues in the knowledge transfer process, and to build their interest in the final knowledge product. Some companies use a lunchtime lecture as a way to engage and share on different knowledge topics rotating through different experts or specialists.
Key differences

- An audience with an Expert differs from a Knowledge Capture Interview in that the purpose is not so much in-depth elicitation of knowledge, as sharing the knowledge with a large audience.
- Also the Audience is less exploratory, and will often give more superficial results, hence the need for it to be accompanied with a later Knowledge Capture Interview.

SUCCESS FACTORS

Note that a knowledge retention initiative is often in part a reaction to a problem caused by a general lack of Knowledge Management. Critical knowledge should not be stored solely in the heads of experts, and a pro-active KM System or Framework, where knowledge is documented and shared, can reduce the urgency of knowledge retention initiatives.

Governance, strategy and leadership – Governance is provided through the combination of:

- An organisation’s leadership expectations;
- Relevant metrics (see below) and
- Support, through the allocation of time and resources.

Knowledge Retention and Transfer (KRT) is greatly supported by the presence of a KRT strategy; a strategic and systematic approach to mapping retention risk and ensuring retention and transfer programs are routinely applied wherever needed.

Other issues

Fear and distrust: KM and general managers need to look for the positives related to knowledge retention, for example helping retirees feel they are “leaving a legacy”.

Selling the concept: Knowledge retention should be sold as a positive enabler, rather than as necessary risk mitigation. Freeing up time for the knowledge holders from responding to routine queries will enable them to focus on more productive, valuable and rewarding work.

Minimising the effort: In many cases the majority of knowledge documentation can be done by a junior learner, by their successor, or by a knowledge engineer. This reduces the burden on the expert, and when the junior documents the knowledge, this cements their own learning.

Transparency: If knowledge holders feel that the aim of knowledge retention is to make them redundant, they will refuse to engage. The guiding principle should be that ‘this is being done with you, not to you’. Knowledge-holders should be involved in the knowledge transfer planning, to maximise their sense of ownership.

The 70/20/10 learning model: KRT activities should be seen as a key part of the “feedback and coaching” element, with more general Knowledge Management supporting the “on the job learning”. KM and Learning and Development should work together to deliver the 70%, the 20% and the 10%.

Pilots, proof of concept and advocates: Knowledge retention initiatives are most easily promoted if people can see the results. Find ‘quick wins’ and communicate them widely to build and maintain momentum.

Organisational context: Future threats and opportunities should be considered, along with any other initiatives to which such a programme may be aligned to facilitate early success.
KPIs

Suggested areas for monitoring and measurement are shown below:

**Activity:**
- Number or percentage of critical skills captured and managed;
- Attrition/turnover rate.

**Maturity:**
- Number or percentage of individuals holding critical and unique knowledge with no identified successor;
- Number of Knowledge Transfer Plans in place for critical positions;
- Percentage completion of actions on Knowledge Transfer Plans.

**Impact:**
- Time to competence for new joiners;
- Aggregate retention risk from knowledge scans.
### REFERENCES AND FURTHER READING

<table>
<thead>
<tr>
<th>Title</th>
<th>Author(s)</th>
<th>Publisher or link</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lost Knowledge: Confronting the Threat of an Aging Workforce</td>
<td>David DeLong</td>
<td>Oxford University Press, USA, 2004</td>
</tr>
<tr>
<td>Succession Planning</td>
<td>CIPD</td>
<td><a href="http://www.cipd.co.uk/hr-resources/factsheets/succession-planning.aspx">http://www.cipd.co.uk/hr-resources/factsheets/succession-planning.aspx</a></td>
</tr>
<tr>
<td>Right Seat/Left Seat</td>
<td>Daniel Widdis</td>
<td><a href="http://desertperiscope.blogspot.co.uk/2007/02/right-seatleft-seat.html">http://desertperiscope.blogspot.co.uk/2007/02/right-seatleft-seat.html</a></td>
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<td></td>
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<tr>
<td>Exit Interviews</td>
<td>Knowledge Sharing Toolkit Online</td>
<td><a href="http://www.kstoolkit.org/Exit+Interviews">http://www.kstoolkit.org/Exit+Interviews</a></td>
</tr>
<tr>
<td>Knowledge Audit</td>
<td>David Skyrme Associates</td>
<td><a href="http://www.skyrme.com/services/kmaudit.htm">http://www.skyrme.com/services/kmaudit.htm</a></td>
</tr>
</tbody>
</table>
Building Best Practice

Overview

As aerospace organisations execute day-to-day operations, they can learn how to improve performance in all activities, acquiring and applying new knowledge in the process. Such knowledge may become what is sometimes termed a “knowledge asset”, i.e. a documented resource containing best practice and/or standards. Over time the continuous development of such assets can become a valuable source of intellectual property; they define the best known way to deliver work and can become a major source of competitive advantage. This chapter details some of the tools that aerospace companies are using to create and update such knowledge assets, as well as examining some of the issues likely to be encountered.

QUESTIONS ANSWERED IN THIS CHAPTER

- How do we define best practice and who decides what it is?
- How do we improve standards?
- What are our most important knowledge assets?
- How and when should we share best practice?
- How do we validate and update best practice?
- What technology helps use of best practice?
- When should we capture best practice?
- How do we control access to best practice and who needs it?
- How much should we invest in building best practice?

Relevant Keywords

- Referential
- Standard
- Instructions
- Techniques
- Methods
- How To
- Procedures
- Doctrine
- Quality
- Guidance
- Good Practice
- Best practice
- Handbook
- Wiki
- Knowledge Book
- Knowledge Base
- Hints
- Tips
In both cases above there will be some knowledge assets that are mandatory requirements, for example by quality requirements or aircraft certification requirements. Other knowledge assets may not be mandated but can still be helpful to document and retain, this chapter focuses on this type of knowledge asset.

We have organised the tools in this chapter according to the different levels of formality:

- **Formal Knowledge Assets**
  an aerospace organisation’s officially endorsed and required way of performing an activity i.e. standard (which must be followed).

- **Informal Knowledge Assets**
  guidelines set within the business context and linked to people for further reference
  - Best practices (which should be followed unless a clear better way can be found)
  - Good practice (which are optional and may save time if followed)

- **Variations:**
  - **Wikis**
    A tool to document, edit and link collective knowledge that is shared between multiple people.
  - **A3 Sheets**
    A condensed ‘one-stop shop’ of knowledge about a product or process.
  - **Design Rationale**
    A method to document the decisions made for example when designing a product.

<table>
<thead>
<tr>
<th>Standards (mandatory)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Best practices (advisory)</td>
</tr>
<tr>
<td>OR</td>
</tr>
<tr>
<td>Good practice (optional)</td>
</tr>
</tbody>
</table>
**Types of Knowledge asset**

**Practice and process-based knowledge assets:** these include procedures, guidelines and other guidance documents relating to an organisation’s critical practices and processes. This knowledge might have previously been undocumented, the relevant knowledgeable people may need to be identified and their knowledge written down (see ‘Knowledge Capture’ guidance in the ‘Retaining Critical Knowledge’ chapter).

**Product-based knowledge assets:** these may include product descriptions or designs, design rationale and design checklists. These will need to be retained for the guidance of people maintaining, servicing, upgrading the product and may include manufacturing and maintenance instructions etc.

---

**FORMAL KNOWLEDGE ASSETS (OR MANDATORY KNOWLEDGE)**

**Also known as** Referential, Standards, Work Instructions, Technique Sheets, Procedures, Doctrine.

**What is this tool?**

A standard or formal knowledge asset is an aerospace organisation’s officially endorsed and required way of performing an activity (Standard Operating Procedure) or designing a component (component standard, rules or checklist). These are internal company standards. A standard is used to ensure a consistency across organisations with multiple business units, or through the lifecycle of a product such as an aircraft. Standards may often form part of a company quality system. A key point is that such standards should contain the most important knowledge that is to be followed by users.

**Deliverables and benefits**

Formal knowledge assets may take many forms, from procedural documentation to CAD drawings. They are often created and stored in electronic form in a document repository (see the ‘Find and Structure’ chapter for more information).

**Who is involved?**

Standards must be approved and applied by technical authorities and the business.

**When should it be used?**

Standards should be reserved for high-value and high-risk activities, where the potential rewards and costs of meeting or deviating from the standard merit the time and resources needed.

---

**Method**

The following suggestions are illustrative only and can be adapted to suit your specific requirements:

**Research:** Current guidance, where it exists,

**Observation:** Watching people perform the activity to know how it is performed presently;

**Interviewing:** Both the technical experts responsible for, and the employees that perform, the activity – see Knowledge Capture

**Review:** A robust review and approval process to ensure that all stakeholders have the opportunity to read and edit the document

**Publication:** according to the formal publishing guidelines in use at your organisation which may include Training, Communication and Archiving (e.g. if replacing existing standards):

**Assurance:** Where appropriate, some form of oversight or inspection may be necessary, to ensure that the new standard is being used.
TOP TIP

Many aerospace companies have created their own standards to control the quality of their work, notably in the fields of design, engineering and manufacturing. All will also conform to the relevant international and industry standards. According to the website of the International Organisation for Standardisation (ISO): “International Standards make things work. They give world-class specifications for products, services and systems, to ensure quality, safety and efficiency. They are instrumental in facilitating international trade.”

Of particular relevance to aerospace employees interested in KM is the latest update to ISO 9000, the standard focused on quality. Clause 7.1.6 within ISO 9001:2015 requires organisations to:

• “Determine the knowledge necessary for the operation of its processes and to achieve conformity of products and services.
• This knowledge shall be maintained and made available to the extent necessary.

When addressing changing needs and trends, the organisation shall consider its current knowledge and determine how to acquire or access any necessary additional knowledge and required updates.”

INFORMAL KNOWLEDGE ASSETS (OR ADVISORY KNOWLEDGE)

Also known as Guidance; Good Practice, Best Practice.

What is this tool?
Guidelines set within the business context and linked to people for further reference. Whereas a standard is mandatory and tells you ‘what to do’, a Best Practice shows the current best known way of ‘how to do it’. The knowledge contained with a Best Practice asset usually continues to evolve as improvements are found e.g. from Lessons Learnt. Over time this knowledge may mature sufficiently to become mandatory.

Deliverables and benefits
Informal knowledge assets may take many forms such as A3 sheets, wiki pages, checklists or other documentation. The contents of a knowledge asset will typically include:

- History, background and context;
- Guidance for future teams, illustrated with stories and examples;
- Contact details of the people who contributed;
- Links to documents and other artefacts;
- Metadata (author, date, keywords etc.).

Method
The following steps set out how to create and maintain a Knowledge Asset:

**Setting the scope:** clarify the knowledge asset’s purpose, sponsor and likely users. The users will often help define the scope and purpose.

**Capturing the knowledge:** identify processes for knowledge capture – see for example Knowledge Capture and After Action Review, or workshops with multiple experts to create a knowledge asset (see for example the Siemens Knowledge Asset Creation methodology).

**Distilling out the guidance:** material should be presented as recommendations for the future, or questions which future users should ask themselves e.g. a checklist or ‘Frequently Asked Questions’.

**Validation:** Any guidance derived during distillation should be validated with the relevant Community of Practice (CoP) or Knowledge Owner.

**Structuring:** The knowledge asset has to be structured to be as useful as possible to the reader (see also Taxonomy). Structure it around the work process, in increasing levels of detail, so readers can dig down to the level they need.

**Presentation:** People learn in different ways and the richer the medium, the more easily knowledge is transferred. Consider pictures, audio and/or video, depending on available bandwidth and technology.

**Publishing:** Store the knowledge asset in updatable form where it can be easily found. A wiki in a community space is ideal for those with online access and wikis are increasingly popular across the aerospace industry. Increasingly digital content is also available on the factory floor but in many cases ‘hard copy’ e.g. laminated guidance books may be appropriate.

**Review:** Seek feedback, appoint an owner for the knowledge (i.e. the relevant process owner, technical authority or relevant CoP) and ensure regular updates.
Who is involved?

- Knowledge owner (i.e. Practice, Process or Product owner) – this may be an expert or technical authority. The asset will be validated and published under their authority, so they will need to have access to drafts and editing rights where necessary;
- Subject matter expert – accountable for writing, reviewing and updating best practice on a particular subtopic, often delegated by the Knowledge Owner;
- Knowledge base administrator – acts as “librarian” for the knowledge base. Does not own the content but provides the overview of the use of the content, developing and maintaining a structure/taxonomy for the knowledge base. Responsible for triggering scheduled reviews;
- Community of Practices (CoP) – where these groups exists they can be valuable sources of knowledge and their input and/or sign-off might be included as part of a validation process. They will be the primary users of the knowledge asset.

When should it be used?

A knowledge asset provides the means to transfer knowledge to many teams or people, separated in time and distance. The most effective mechanism for knowledge transfer is face-to-face but is not always efficient. Knowledge assets are most applicable where knowledge needs to be reused over a long time and accessed by many people.

Example

The image above is from a knowledge asset used by an aerospace supply chain company:

Checklist of key elements

The creation of effective knowledge assets requires the following:

- Relevant, up-to-date guidance on the activity in question;
- Endorsement from the acknowledged technical expert(s) in the field;
- Forums for Community of Practice (CoP) discussion to inform updates;
- A review and update process to ensure topicality;
- Metadata to identify when the asset was published and by whom.

You know it’s working when…’

As with Formal Knowledge Assets the signs that informal knowledge assets are improving performance include:

- Reduction in variation in performance or quality across disparate sites;
- Reduction in returns from clients and/or complaints and queries;
- Reductions in number of loss-time incidents and accidents.
- Reduced schedules for follow-on similar projects;
- Reduced budgets and/or increased productivity for follow-on similar projects.
What is this tool?

Wikis are well known in the public sphere and are also used in the private sector to document collective knowledge that is shared between multiple people. Wikis can take different forms ranging from open-governance approach that allows the content to be grown organically by users or a controlled-governance where the scope and content are limited to defined parameters and structures.

Key differences

- Wikis are versatile and can be used to document many different types of knowledge and often presented in an appealing way to the user.
- They can be created and edited by many people working together at the same time which is important when building a collective view.
- Wikis can be self-governing whereby readers and contributors may identify errors, inconsistencies and out of date content.
- Some wikis feature categories for classifying content according to a Taxonomy and all wikis enable hyperlinking between articles.
- Content may include:
  - Project pages – that outline the history of a project and major milestones and documentation;
  - Product pages – these include all technical information about a specific product;
  - Process pages – these set out a specific method or technique, showing users how to follow it.
- Wikis can often be used to ‘signpost’ users to the most relevant and important content that may be otherwise buried for example in document archiving tools or shared folders that they may not have known existed. In this respect wikis can be an important time saving device.

Example

A screenshot of a Landing Gear focused wiki in use at Airbus UK (below).

For more detailed examples see also Example Content for a Typical Product Page and Process Page in the appendices. A publicly available Aviation oriented wiki http://www.skybrary.aero/index.php/Main_Page
Taking its name from the optimum size of paper on which this tool should be displayed, an A3 sheet is a condensed ‘one-stop shop’ of knowledge about a product or process.

What is this tool?
Taking its name from the optimum size of paper on which this tool should be displayed, an A3 sheet is a condensed ‘one-stop shop’ of knowledge about a product or process.

Key differences
• The size of an A3 sheet can incentivise the authors to limit content to the most useful information and can appear less daunting than an open ended task to ‘write down your knowledge’.
• A3 sheets can include images, technical information, checklists and process guidance;
• As such, they can be stored within wikis, other knowledge repositories or printed on hard-copy posters.

Example
An A3 sheet from Airbus is shown below:
Also know as Decision Rationale, Reasoning, Trade-off Studies, Decision Mapping.

**What is this tool?**

A design rationale is a specific kind of Knowledge Asset that sets out and explains the decisions made when designing a product.

**Deliverables and benefits**

A design rationale provides a comprehensive explanation and graphical representation of a product’s final design decision Verification – i.e. does the design reflect the designers’ decisions?

- Evaluation – the various options considered throughout the design process can be recorded and weighed against one another using the design rationale as part of this process;
- Modification – possible changes to the design can be considered, using the design rationale as a fixed point against which to compare proposed alterations;
- Teaching – the design rationale can be used to teach people about the design and finished product;
- Documentation – the design rationale can capture the design deliberations, alternatives discussed, reasons behind the design decisions and the product overview.

**Who is involved?**

The roles recommended for creating a design rationale include:

- Design team members
- Head of design and/or product project manager

**When should it be used**

The value of a design rationale increases in proportion to the value and complexity of the design from which it is drawn. It is not necessary for all designs but where the design is new or where it is original and cannot be replaced by other designs available in the market (i.e. the design is proprietary intellectual property) then a design rationale is recommended.

The larger and more complex the design, the better the justification for creating a design rationale, and the easier for the costs of doing so to be absorbed into the wider developmental outlay.

**Method**

The following tools and processes should be used when creating a design rationale:

**Design-process mapping:** setting out the planned process for creating the design in order to identify the points at which deliberate knowledge capture will be possible (i.e. stage gates) (Note: further, reactive knowledge capture will also be necessary as the design evolves). A suggested approach would be:
- Set out the different design choices;
- Identify those that were discarded and why;
- Identify those that were selected and why.

**Lessons capture:** at each stage gate, lessons should be identified, captured and (a) fed back into the design process for implementation in subsequent stages and (b) recorded within a Learning History for the whole design project;

**Interviews:** design team members should be interviewed at each project stage (or as a minimum, at the end of the project) to identify further knowledge that was not previously identified.

**Write-up:** interview transcripts and lessons should be used to create a knowledge asset (ideally within a Wiki, or similar collaborative technology tool), in which the key decisions are captured, along with the potential options available at the time and the reasons for the decision made.
Example
Graphical representation can be used to record the decision points, the options considered and the reasons for their rejection or acceptance, as shown below:

You know it’s working when…’
A design or decision rationale can:
• Reduce the risk of erroneous design modification;
• Improve the ability to effectively modify existing design;
• Reduce query response time once a product has been launched.

“ The value of a design rationale increases in proportion to the value and complexity of the design from which it is drawn. “
TOP TIPS

Knowledge creation and re-use is cyclical, with knowledge assets moving through various stages and states as they mature and their content is both pushed to users when created and pulled from them when needed. This 2-way ‘push and pull’ dynamic is a key part of KM.

Such cycles are demonstrated in the diagram (right), which features the topics explored in each chapter of this toolkit – see the full version at KM as a System of Processes and Activities.

A wide range of aerospace organisation activities can trigger the knowledge cycle. The following list is not exhaustive but examples include:

- **Project reviews (both after each stage and on completion)** – these can include tools already covered in this toolkit, such as After Action Reviews, Lessons Capture Workshops and Knowledge Harvesting Interviews;

- **IP registration** – as part of the formal R&D process, organisations will develop new knowledge and should build best practice development for internal exploitation as well as registering new IP to protect it externally;

- **Recognition of the need to codify knowledge** – this recognition can come through managerial oversight (for example the recognition of multiple variant practices in different business units), through the need to retain knowledge from one or more ageing experts, or as a result of a Knowledge Scan.

Update of a knowledge asset can be triggered by:

- Lessons captured from an After Action Review or Lessons Capture Workshop, which inform an improvement to current best practice;

- Answered questions in a Community of Practice, which inform a gap in existing best practice;

- Change requests, for example from manufacturing or maintenance, which inform an improvement to current design standards.

Boeing uses KM to iron out irregularities and standardise best practice. It promotes the idea of ‘Standard Work, One Boeing Approach’. Its knowledge cycle is shown, right.
Knowledge Assets are intended to satisfy the need for searchable, findable, browseable knowledge which is easy to assimilate and accessible at point of need. Increasingly the trend is to have knowledge available online wherever possible, rather than in printed manuals. The need to be able to find knowledge at the right level of detail at the right time necessitates the use of hyperlinks to further details. Some knowledge needs to be recorded as audio or video to facilitate understanding, so online Knowledge Assets need to have this functionality. Such requirements make the following potential capabilities attractive and viable:

- **Wikis** – online collaborative tools wherein multiple users can co-create, review and edit content. Wikipedia is perhaps the most well-known platform of this type and many organisations use Wiki technology for in-house knowledge storage and renewal;
- **Portals (e.g. SharePoint)** – online collaborative platforms wherein users can create and share documentation and other content, consistent with user permissions and other security considerations (see image, right);
- **e-Learning sites** – online platforms for training and the delivery of other proprietary explicit knowledge, normally falling within the Learning & Development (L&D) remit;
- **Knowledge Based Engineering (KBE)** – a systematic approach to the creation, capture and reuse of knowledge as part of engineering processes. Knowledge is stored in machine form, and may be linked to CAD packages or other engineering work tools.

**Example**

Example knowledge portal for managers, from Northrop Grumman².


“Knowledge Assets are intended to satisfy the need for searchable, findable, browseable knowledge which is easy to assimilate and accessible at point of need.”
### SUCCESS FACTORS

What makes building best practice work? What are the keys to success? What factors need to be considered?

Successful development of best practice within the aerospace industry depends upon bearing in mind the following factors and issues:

**Timewriting**

‘Booking work against ‘time-codes’ helps to control costs but can inhibit any activity that does not fit neatly into the project framework, such as creating knowledge for others. Therefore, some companies create additional time-codes to encourage and account for activities such as collaboration or the creation and update of best practice, while others require mandatory knowledge capture as part of the project deliverables.

**Security**

Best practice must be created, distributed and updated within an appropriately secure environment. However, respect for such constraints must not be allowed to become an excuse for a default ‘no sharing’ attitude.

**Role of experts**

Experts should be recognised and rewarded not so much for what they know but what they do with what they know – i.e. the seeking and creation of new knowledge, its update and endorsement and its wider communication to others.

**Role of newcomers**

Newcomers are often highly motivated to learn and have more time available than experts to document best practice inside knowledge assets. They are as well the ones that can benefit from reading knowledge assets and therefore highlighting and implementing improvements for the next newcomers.

**Relevance and currency**

Processes to create and update best practice must cover the removal and archiving of old versions that have become out of date, to ensure topicality and to maintain the credibility of the recognised expert or authority. Therefore, good document control and Information Management (IM) discipline (for example ‘wiki gardening’) are important.

**Cost-benefit analysis**

Not every activity within an aerospace organisation is of equal value; nor do they all carry an equivalent risk. Therefore, cost-benefit analyses should be used to identify which activities have a sufficient priority to justify the allocation of time, money and resources in creating knowledge assets.

**Competence**

As they establish best practices, aerospace organisations should also train people in their use and measure their competence in applying them.
Suggested areas for monitoring and measurement are shown below:

**Activity:**
- Number (or percentage) of times a certain knowledge asset is sought and viewed. (Note: many online knowledge bases enable articles to be rated);
- Number of articles created, accessed and edited.

**Maturity:**
- Number and completeness of best practice knowledge assets;
- Review and update frequency for best practice knowledge assets;
- Compliance with standards;
- Compliance with best practice.

**Impact:**
- Reduction in waste/quality improvements;
- Time saving and efficiency improvements.
## REFERENCES AND FURTHER READING

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Learning from Projects

Overview

Projects and operations offer significant opportunities for organisational learning resulting in continuous operational improvement. ‘Lessons learnt’ is becoming familiar as a way in which organisations can improve performance. The most successful organisations in this field are those with a systematic approach. They create a lesson learning framework that becomes part of their ‘DNA’. This chapter covers what this requires and what factors help or hinder its development, and provides examples of learning before, during and after projects.

QUESTIONS ANSWERED IN THIS CHAPTER

- How, why and when should we do ‘lessons learnt’?
- How can we retain knowledge from one aircraft project and apply on the next one?
- How can we benefit from failures and successes?
- How can we identify root causes and key learnings?
- How do we ensure project teams learn from one another?
- How can we de-risk projects?
- What behaviour enables good project learning?
- How do we avoid making the same mistakes or reinventing the wheel?
Relevant Keywords

- AAR
- Foresight
- Hindsight
- History
- Insight
- KM Plan
- Learning After
- Learning Before
- Learning During
- Lessons Learnt
- Lessons Learnt Review
- LLR
- Mentor
- Peer Assist
- Projects
- Retrospect

**TOOLS INCLUDED IN THIS CHAPTER**

- **Lessons Capture Workshops**
  A collective reflection held after an activity used to identify both the good or bad points in what happened and the lessons (learning points) arising.

- **Learning History**
  A summarised learning from a project or other piece of work, compiled through individual interviews with the people involved.

- **Peer Assist**
  A process for bringing knowledge into a project by inviting those with knowledge and experience from similar projects to provide recommendations, options and guidance.

- **Lessons Learning System**
  Ensures a comprehensive approach is taken to lesson learning, with a focus on the implementation of recommendations and actions.

- **KM Plan**
  An organised, systematic and focused approach to identifying and implementing the knowledge goals of a project; done as part of project planning and control.
Also known as Lessons Learnt Review, Retrospect.

What is this tool?

Lessons Capture Workshops are a collective reflection held after an activity. They identify both the good or bad points in what happened and the lessons arising, and are an effective way of capturing lessons from a project team. By facilitating a dialogue with the whole team (usually face to face) you can bring out the knowledge that comes from the team interactions. This is knowledge that any one individual may be unaware of, but which the team as a whole knows.

Deliverables and Benefits

The main outcome of the workshop is a set of lessons with associated actions, e.g. for improving the processes of future projects or designs of future products.

Some of the lessons may have wider applicability and should be passed on to the appropriate persons e.g. via subject matter experts or Communities of Practice (see Lessons Learning System). Lessons should be captured in a standardised Lesson Template.

The team reflection and discussion help people to learn from the past in a non-judgmental way to improve the future. Regular Lessons Capture Workshops can increase openness and performance focus, and eliminate a blame culture.

Who is involved?

The team who were involved in delivering the project including the team leader and selected team members.

Future project team in delivering the project including the team leader and selected team members.

A Facilitator should be used, in order to manage the process and deliver high quality lessons. It is very difficult for a team to facilitate their own lessons learnt process with any level of objectivity.

When should it be used?

Lessons Capture Workshops can be most valuable when the task is high-cost, high value, or on the critical-path, and will be repeated by this or another team. Workshops should be scheduled:

At project completion: as soon as possible after a project is completed.

After key project milestones: to ensure learning appropriate to that phase is collected.

After key events: whilst the memory is still fresh of what happened.

Practical Arrangements

Location: Choose a conference room, or off-site facility, where the team members can sit round a single table. This should be quiet and undisturbed.

Numbers: You cannot really hold a workshop with more than about 12 people, if the team exceeds 12, then invite the core team, or hold sub-workshops.

Facilitation: Appoint a neutral external facilitator.

Duration: varies depending on number of people, duration, and complexity of the project:

• 30-60 minutes for a short, simple project or
• 4+ more hours for a 10 person, six month project
• 2 days for complex involvement between several departments or companies.

You know it’s working when…’

• Performance improves and recurring issues disappear or are managed more effectively (i.e. with lower costs, faster execution, improved safety).
• The number of people taking part in Lesson workshops increases.
• Lesson workshops start being used widely, in non-technical contexts as well as technical.
Method

1. Review the project objectives: The workshop begins by revisiting the objectives, deliverables, and measures of the project. Questions include: ‘What did you set out to do?’ ‘What was the understanding at the start of the project?’

The team leader should prepare a short (15 minute) presentation of the original objectives of the project, referring back to original documents such as the terms of reference. Circulate these prior to the meeting.

2. Discuss “what actually happened”: Questions include: ‘What did you achieve?’ ‘Did you get what you wanted?’ ‘Did you meet the deadlines?’ ‘Were satisfactory measures achieved?’ ‘What happened along the way?’

The team leader should prepare a short (15 minute) presentation of the final deliverables, including items such as actual vs budget figures, actual vs estimated timeline, customer satisfaction surveys, performance data etc.

3. Identify the learning points: The facilitator then asks the members of the team what went well (in the context of delivering objectives) and what could, with hindsight, have been done better. These success factors and challenges can be identified through brainstorming, through discussion, or using post-it notes. If there are very many learning points, they can be prioritised.

4. Discuss each learning point: The facilitator guides a discussion among the team to collectively determine why the successful aspects went well, and how these success can be repeated in future, and why the challenges or disappointments occurred, and how these challenges can be met or avoided next time. For each learning point the facilitator leads the group to identify a specific actionable recommendation for the future, which is the “lesson” for that learning point.

5. Next steps: Identify any direct actions that need to be implemented as a result of the workshop findings or any further work required to analyse the information and put corrective actions in place.

TIPS

- Closing: Gather final recommendations by asking participants to score the project 1-10 (low to high). If it is less than 10 each member is asked what would have made it a perfect ten.
- Recording: An audio recording is often the best way to capture the discussions during the meeting. Ask the permission of participants before starting the recorder.
- Hierarchies: Any senior managers participating should agree to allow open discussion of topics and avoid imposing their view or dominating proceedings.
- Environment: The facilitator must work to create a climate of openness and honest inquiry. The objective is to identify the lessons, not to assign blame or praise.
- Be inclusive: Everyone should nominate learning points for discussion.
- Prioritisation: All should vote, ranking each topic according to impact and likelihood of repetition. Discuss each topic in turn, in priority order.
- Avoid Blame: When discussing root causes, ask: why, when and how but not who – this is not a blame game and people will not take part if they think it is.
- Breaks: Have a brief break after each discussion.
- Humour: Maintain a sense of humour.
An Example of a completed Lesson Learnt Template:

**Lesson Title**: Component not complying to tolerance

**Date of Occurrence**: 01.01.13

**Learning Theme**: Part tolerance

**Status**: Current lost time incident

**Contact**: Manufacturing Department

**Lesson Priority**: High

---

**Expected Event**

Parts are measured at the end of a set of manufacturing steps and found within the customers defined acceptable range.

**Actual Event**

Parts are measured at the end of a set of manufacturing steps were found to be within tolerance at certain times and not at others. This varied by shift, by machines used to manufacture the components and by the manufacturing teams. There seemed to be no common factors that linked the parts being within tolerance and not at other times.

**Root Cause**

Manufacturing facility was built on the edge of a tidal estuary. The components went out of tolerance in relation to the tides as the whole building was moving with the tidal difference.

**Learning for others**

Ensure that inspection equipment is set up sufficiently independent of building movement.

**Action**

Inspection equipment was recalibrated to take account of the tidal variation.

**Action by whom**

Equipment owner

**When does it need to be done?**

Before next shift

**Date action complete**

Week 4 - 2016

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**Author**: Give the lesson a title which reflects the content; e.g. “effective bidding”, not “Lesson number 1235”.

**When did this success or challenge occur?**

**What activity does this lesson refer to?** E.g. Bidding, contracting, client relationships, etc.

**High, medium or low priority.**

**What was supposed to happen?**

**What actually happened?**

**Why was there a difference between expected and actual?**

**What lesson do we pass on to other projects?**

**What action do we take to embed this learning?** E.g. update of procedures, change documents etc.

**Who takes the action?**

**When does it need to be done?**

**When was it actually done?**
Variation on Lessons Capture workshop

What is this tool?
A short focused meeting, conducted by the team, lasting half an hour or less. Designed to identify and apply new learning and knowledge.

AARs allow capture of useful operational knowledge of immediate short-term benefit, which can be ploughed back into repeat activity. It is like “learning on Tuesday to perform better on Wednesday”. This allows you to improve performance by:

• Making course corrections during activity based on what you learn;
• Addressing and optimise the way you work as a team;
• Starting to build your collective operational knowledge.

Key Differences

Usage: held immediately after the process or action. For example after a completed task or on shift handover, where learning has occurred; this means when:

• Things have not gone as expected;
• The team has found new successful methods;
• The team has identified new problems and pitfalls.

Method: After Action Reviews involve a team discussion around 5 questions:

• What was supposed to happen?
• What actually happened?
• Why was there a difference?
• What have we learnt?
• What will we do about it?

Deliverables: taking part in the AAR will help individuals learn and they can write down the learnings in a personal log book. The facilitator can record actions and advice for other teams.
What is this tool?
A Learning History is the knowledge from a project or other piece of work, compiled through individual interviews with the people involved. It involves a single interviewer or a small team, holding unstructured interviews with key team members and then producing an analysis of the results.

Key Differences

Usage: It can be used when the team is too big or too busy to schedule a lesson capture workshop. This approach is time-efficient for the interviewees, who spend an hour being interviewed, rather than half a day in a workshop.

Approach: The interview process is similar to that outlined in the separate Knowledge Capture Interview guidance in the Retaining Critical Knowledge chapter.

A distillation and analysis step consists of extracting the core knowledge from the interviews and presenting it as guidelines for the future using:

- The key themes which emerged from the interviews;
- The key recommendations associated with each theme;
- Quotes, stories and anecdotes to support the recommendations.

Deliverables: The outcome of the Learning History is an Informal Knowledge Asset that includes:

- Guidelines for the future (expressed in the words of the interviewees);
- A history from the project to illustrate the guidelines;
- The names of people involved for future reference;
- The key artefacts.
TOP TIPS

- **Lead by example** The Shift, Project or Programme Manager should turn up at the start of an AAR or Lessons Capture Workshop to ensure that the rest of the team come along as well. He or she can then disappear to let free discussion take place and return for a summary at the end. Repetition will enable these meetings to become habitual.

- **Keep it clear and simple** If short-term lessons of limited scope and reach are identified, these should be written in the language that most of the team will understand. If bigger broader issues are discussed, it is good practice to write them up so that they are understood by anyone that is not from the team. Technical jargon should be avoided where possible or, at the very least, explained.

- **Maintain an open atmosphere** Well-run Lessons Capture Workshops may potentially include outsiders, either to offer their own perspectives or listen in on the team discussion. In such circumstances, using a facilitator from outside the team will reassure all participants that both discussion and output will be balanced and fair. By contrast, an AAR will often be held within a team itself, meaning a lot of shared experience and perhaps less need to go back into historical detail. An open atmosphere must be maintained and participants must feel they can raise questions or challenge the ‘collective wisdom’.

- **Security, confidentiality and intellectual property (IP) considerations** Before starting a Lessons Capture workshop or Learning history, you will need clear direction on whether quotes will be attributed or used anonymously. Participants will need to be informed about editing rights if their names are to be used. Data restrictions should also be considered.

- **Setting expectations** On projects with frequent ‘churn’ of personnel it is a good idea to let everyone know of the expectation that they will participate in Learning History interviews or AARs from the point of hiring. There is a risk that short-term contractors may resist such processes as they feel that ‘their knowledge is all they have’ and that sharing it will make re-hire less likely. They need reassurance from project managers that sharing their experience increases their value.
What is this tool?

A Peer Assist is a process for bringing knowledge into a project at the outset. The host team will lay out their plans, objectives, issues, opportunities and challenges, visitors will use their knowledge and experience from similar projects to provide recommendations, options and guidance. The host team is not obliged to act on the recommendations but may use them as input to start the project from an enhanced knowledge base.

The visitors apply out-of-team knowledge to the team’s context. A Peer Assist is one of the easiest and most effective ways of bringing knowledge to the point of need.

Deliverables and benefits

A Peer Assist should have clear objectives and deliverables (such as producing a ranked listing of risks and options, or cutting 20% off the project cost, or a reduction in schedule of 25 days etc.).

Many organisations find Peer Assists increase openness, establish cross-business networks and communities, and increase willingness to learn from others.

Who is involved?

The host team are the ones who need the knowledge and who set up the Peer Assist;

The visitors are those who have the knowledge, and come to the Peer Assist to help the host team. Comprised of people who have recent experience and practical knowledge of similar projects in the past.

When should it be used?

When there is a lack of knowledge or experience: At the start of a project where the team may be uncertain on how to proceed or lack the required knowledge.

When valuable knowledge can be gained: the cost of holding the event should be balanced against the value of having the new knowledge will add to the business. The suggested pre-conditions for using Peer Assist are as follows:

- The required knowledge is complex knowledge, which has not been already codified into standards and best practices.
- The Project team has considered traditional sharing methods such as e-learning, formal training, expert support etc.
- The scope of work, and the issues which need to be discussed, are clear e.g. significant budget, technical or resource challenges.
- The project team have enough knowledge but still need expertise and experience from others to help make the correct decision.
- The potential saving exceeds the cost of the meeting.

You know it’s working when...

The Project team feel more aware of issues they are likely to face and better prepared to deal with them. Whilst the Peer Assist itself is the ‘main event’, one sign of success is the continuation of conversations between individuals on both sides and the deepening of the collaborative and educative relationship.
Method

1. **Sponsors welcome**: kick off the formal part of the Peer Assist with a welcome from the Peer Assist sponsor and explain why the Peer Assist has been called, its objectives and deliverables and why it is important to the business.

2. **Hosts present their context**: the host project team explains the project history and context, its current status, their plans and aspirations and any foreseen risks. Some of this can be provided as pre-reading beforehand.

3. **Visitors present their experience**: the visitors can talk through recent relevant experience to the project team, explaining their background and relevant experience.

4. **Q&A sessions**: The visitors need to develop a good understanding of the details of the issues, the level of understanding, the available data and the degrees of uncertainty. Dialogue helps, possibly done ‘one-to-one’ between specialists. The project team should also question the visitors about any insights they can bring. This can take up to 50% or more of the Peer Assist.

5. **Formal conclusion and feedback session**: is needed at the end, to summarise the outcome and present results. Generally one of the visitors will do this. This can be followed by a first feedback from the project team on “what have we learnt from the visitors?” and “what are we going to do about it?”

6. **Follow up**: The Peer Assist is not a one-time event with no consequence. Some follow up will be needed, presenting an opportunity to start off some more learning processes. This could include:
   - Report back on the action list (from hosts to visitors).
   - Invite the visiting team back to review progress.

---

**TIPS**

- When identifying participants, ask your networks or communities of practice to find a range of experienced people. Try not to use the same people all the time.
- Review the Peer Assist at the project end. Look back at the Peer Assist as part of the end-of-project lesson capture.
- Be clear on the event’s aim (e.g. options and insights) and plan time to achieve them.
- Allow time to develop rapport and create the right environment for sharing.
- Allow a balance between telling and listening.
- Consider who might benefit from this knowledge then share it with them.
- List and commit to actions and keep the Peer Assist team updated.
SITE VISIT

Variation on Peer Assist

What is this tool?
Individuals or teams visit another site (either external or within their own organisation) to see the equipment and processes in action to understand the operating context, ask questions of the staff and try things out for themselves.

Key differences

Usage: A Knowledge Site Visit transfers practical knowledge from a person or team, while they are still engaged in a project/process, e.g. someone wanting to install a new piece of equipment might visit another site which is already using it, or to view an installation procedure.

Approach: Similar to a Peer Assist but taking place in the context and location of the operational activity. Normally where the specific, high-value knowledge is currently being applied. Unlike a Peer Assist the visitors are the people seeking the knowledge.

Deliverable: A Site Visit’s aim is to document knowledge about the practices at the observed site. This is a knowledge asset and should be structured to make it easy to learn and share the lessons from the visit.
What is this tool?
A Lesson Learning System ensures a comprehensive approach is taken to lesson learning, with a focus on the implementation of recommendations and actions. A Lesson Learning System requires the following key elements:

- Roles
- Processes
- Technology
- Governance

Deliverables and Benefits
Typically a Lesson Learning Framework will ensure the systematic identification, capture and re-use of key learning from projects. Benefits can include:

- A lesson repository to which future project teams can refer;
- Consistency between diverse functions and project teams;
- Reduced schedules and costs for similar projects;
- Clearer ownership of issues by forwarding lessons and actions to those who can do something about it;
- Effective escalation of problems to senior management if required.

Who is involved?
Roles: Typical roles within a lesson learning framework (there may be others) include:

Project manager: ensures that lessons from a project or team activity are identified and shows leadership to the wider project team to encourage them to participate in all learning activities.

Facilitator: appointed to help with lesson identification;

Process owners, product owners and experts: accountable for the definition and quality of particular processes or product areas; their input is needed to validate lessons and implement recommendations to designs/procedures;

Senior sponsor or ‘Learning Champion’: can influence Senior Management and seeks to maintain the organisation’s ‘learning momentum’.

Lessons (or KM) team: oversees the learning and other KM processes, and provides some assurance/support for the overall lessons learning system.

When should it be used?
It makes sense to implement a Lessons Learning System when an organisation begins to capture a large number of lessons that need to be managed more systematically and to enable lessons to be shared with wider groups of people across different functions and possibly different countries.

Feedback Lessons should include the details of the person (a) writing it and (b) from whom further information may be gained (Note: these may not be the same person). It is good practice when re-using a lesson to contact the lesson originator to let them know if a lesson proved useful. In too many organisations, employees stop engaging with lessons learning efforts because “nothing ever changes” or “we always keep on learning the same old lessons”. A feedback loop provides a valuable opportunity to demonstrate the value of KM in general and ‘lessons learnt’ in particular.
**Method**

As well as the **Roles** defined above, a Lessons Learning Framework involves defining a Process for the identification and management of lessons through their lifecycle. The diagram below illustrates a process flow for lessons learning – i.e. how a lesson moves from identification to implementation of recommended actions.

---

**Technology** The primary role of technology is to facilitate the storage and retrieval of lessons, associated actions related to lessons and automate the lessons flow. Lessons should be written into a standard lesson template to ensure consistency and enable subsequent analysis. A suggested **Lesson Template**, including explanatory notes is included within the section on **Lessons Capture Workshops**.

**Governance** Effective governance requires 3 elements:
- clear expectations for lesson learning activity and quality;
- support, including training, coaching and reference materials;
- gathering and reporting metrics on lesson learning activity, and measuring whether corrective actions are implemented successfully.

---

‘**You know it’s working when…’**

Lessons will move from being a way of recording advice between projects and will become a way of driving performance through the deliberate implementation of recommendations.
What is this tool?
A KM plan is an organised, systematic and focused approach to identifying and implementing the knowledge goals and objectives of a project. It can form part of typical front-end project planning activities.

It allows Knowledge Management to be fully embedded into project controls, at the same level of rigour as risk management or document management.

Deliverables and Benefits
“Learn Before Doing” is one objective of Knowledge Management. KM during project planning assigns accountabilities to individual project team members and enables these accountabilities to be monitored and reviewed. The KM elements of a project plan should include:

- “What knowledge is needed by the project?”
- “What knowledge will be created by the project?”
- “What system of processes, technologies and roles will be used to manage knowledge within the project?”
- “What actions need to be taken to implement the system?”
- “Which people are accountable for individual actions?”

Who is involved?
For smaller projects, the PM should draw up and manage the project plan ensuring that the KM deliverables are included. For larger projects within larger organisations, a dedicated project Knowledge Manager could be used to manage these aspects of the project reporting into the overall project manager. Other stakeholders should provide input to the KM plan.

When should it be used?
As part of the set-up activities early in the project. When the project plan is drawn up with risk management, document management and other front-end planning activities.

Method
- **Hold a Project planning workshop to include KM**: The KM activities within the project plan should undertake the following:
  - Identify and rank key knowledge inputs and outputs in the form of a knowledge register;
  - Assign actions for seeking and for sharing knowledge;
  - Agree the project ‘KM protocol’ i.e. the governance which defines the way knowledge will be managed in the project.
  - Create an implementation plan to make sure the protocol is ready to use – e.g. training/induction of staff in the tools and technologies.
- **Use the plan**: The plan is used by PM to review whether a project is applying KM and has identified all the critical knowledge inputs and outputs. Along with other reporting mechanisms, it is reviewed at project stage gates. The plan is also used by the project members to track learning actions and close-out lessons learnt.
- See the [KM Plan Template](#) in the Appendices for further guidance.

‘You know it’s working when…’
KM planning identifies critical knowledge before it is needed and can therefore reduce risk within the project by taking work off the critical path. Over time, like-for-like projects will reduce in both length and cost.
Learning from Projects

KNOCKLEDGE GAP ANALYSIS

Variation on KM Plan

What is this tool?
A knowledge gap analysis is a short (half day) meeting where the members of a project team come together to define the missing knowledge needed in order to successfully deliver the project, to determine actions and accountabilities for knowledge searching or knowledge creation to fill the gaps.

Key Differences
Knowledge gap analysis should be done in the early stages of any major project or product development activity; once the requirements are set.

• The main tools for the Knowledge Gap Analysis are a large whiteboard, a flipchart, and a set of post-it notes.
• The project leader writes the product requirements in the top right hand corner of the whiteboard.

• The project leader then draws a schematic of the product up on the whiteboard, broken down into its main subcomponents or modules.
• The participants brainstorm on a series of post it notes asking open questions about the whole product, the modules, subcomponents, market and/or operational and functional requirements.
• Once you have plenty of post-it notes, you assign individuals or groups to work on question areas, to decide the best way(s) to answer the questions on the relevant post-it notes. Ways to answer the questions might involve searching for existing knowledge, or creating trials and prototypes.
• Then reconvene the whole group, and develop an action list on the flipchart to close the knowledge gaps. Ask the individuals and groups to feed back the actions they propose, and ask for additional suggestions for actions that the individuals or groups may have overlooked. Prioritise the actions, and assign them to individuals.

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PRE-PROJECT REVIEW OF LESSONS

What is this tool?
Sometimes known as a ‘Before action review’. It is a process used by teams to prepare for upcoming activities by reviewing applicable lessons from previous projects. A pre-project review of lessons is an activity that may feature within a KM plan.

Key differences
The review involves asking the following questions:
• What are the intended results?
• What challenges can we anticipate?
• What has been learnt from similar situations?
• What processes do we need to follow, and have any of these been updated?
• How can we improve on previous experiences?

Large organisations may use external facilitation to organise and run an event. Or, the team can divide the scope of work up amongst themselves. Each functional expert can gather lessons and report back to the wider project team. This will identify people with relevant experience who can provide further support (e.g. at a Peer Assist).

SUCCESS FACTORS

Leadership
• Leaders should lead by example by taking part in such initiatives and show candour, self-criticism and a willingness to listen to others’ experiences. Such senior support should be sought and maintained.

Time frame
• Some aerospace projects can last many years therefore an aerospace learning framework needs to address long periods between repeat activities.
• Long product development cycles and internal technical language creates a complex organisational context. Plan KM activities well in advance and ensure full buy-in from the start.

Technology
• Efforts to manage knowledge in general (and learn lessons in particular) are shaped by ageing IT infrastructure and legacy processes that may have outlived their usefulness. Simplicity should be an over-riding consideration for those seeking to learn from projects and other collective activities.
• Consider the extent to which lessons can be circulated to the relevant people, consider the use of Enterprise Social Networking tools as a way to circulate and discuss lessons and therefore increase awareness.

Security
• Aerospace has to observe both national security and international legal restrictions on the sharing of material. Security considerations should never prevent the sharing to knowledge except in specific circumstances.

Stakeholders
• External stakeholders must be included which means lessons capture meetings with contractors and customers. Getting 3rd parties to identify and learn lessons as a contractual obligation drives continuous improvement and deepens long-term commercial relationships.
KPIs

**Activity:**
- How many lessons are being captured?
- What percentage of lessons is being closed out, through the closure of associated actions?
- What is the average age of ‘open lessons’? How does this vary by function?
- What is the average rate of closure? How does this vary by function?
- How many ‘duplicate’/recurrent lessons are there?
- How many lessons meet the required quality standard?
- What lessons are sought and/or read more often than others?
- What lessons receive more comments than others?
- Which functional areas raise most lessons?
- What trends or themes are revealed by lessons analysis?

**Maturity:**
- How many business areas meet the corporate expectations for lesson learning?
- How many projects hold lesson capture or AAR meetings?
- How many processes are well-documented?

**Impact:**
- Are costs and/or schedules decreasing as a result of lesson learning?
- Is the bid/success rate improving?
- What costs have been avoided as a result of lessons learnt?
- What is the value of lessons learnt to date? (i.e. in terms of money, time, reputation, quality or safety).
### REFERENCES AND FURTHER READING

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<thead>
<tr>
<th>Title</th>
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<tr>
<td>Learning in the thick of it</td>
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Enabling Collaboration

Overview

The Aerospace industry requires collaboration between dispersed people with diverse backgrounds and skillsets in order to deliver a shared objective, which is often to solve complex technical challenges. ‘Collaboration’ is defined as joint endeavour between people and teams that do not normally work together on a frequent basis, and thus differs from teamwork. Furthermore, collaboration often involves mutual support between people that are not co-located and usually requires intelligent use of information and communication technology.

The value from collaboration comes primarily through four mechanisms:

• Problems or challenges are solved more quickly and at reduced cost, by tapping into a range of knowledge and experience from across the organisation that is not available within the immediate team.
• Teams achieve better results and outcomes by harnessing the diversity of skills and knowledge within the global organisation.
• Improved plans and strategies are developed by providing teams with access to best practice and shared learning, thus allowing them to avoid common pitfalls.
• Collaboration between teams and regions provides greater opportunity for individual development and learning.

QUESTIONS ANSWERED IN THIS CHAPTER

• What is true collaboration and when should we do it?
• How do I find the ‘right people’ to collaborate?
• What structures and resources are needed for collaboration?
• How do we collaborate effectively and who is accountable?
• What are the pre-conditions for effective collaboration?
• How do you create, enthuse and sustain (online) collaboration?
• What are the threats and blockers to collaboration?
Relevant Keywords

- Community
- Conversation
- Discussion
- Documents
- Exchange
- Experts
- Folders
- Innovation
- Network
- Networks
- Online
- People
- Sharing
- Social

TOOLS INCLUDED IN THIS CHAPTER

- **Community of Practice**
  A network of practitioners within an organisation who help each other perform better by sharing their knowledge.

- **Enterprise Social Networking**
  Online tools with ‘social’ features for the purposes of facilitating conversations between people.

- **Document Sharing**
  Is where multiple individuals can access and edit a single document in order to work together on it – sometimes in real-time.

- **Collaboration Spaces**
  Locations where employees are freed from the usual work constraints and encouraged to collaborate with others.
Also known as Professional Network, Knowledge-Sharing Network, Community of Interest, Expert Advisory Group.

**What is this tool?**

Communities of Practice (CoP) are peer networks of practitioners within an organisation, who help each other perform better by sharing their knowledge in a specific domain of knowledge. For example, a Community of Practice might be set up for ‘control systems’, to can raise issues and problems others in the community can provide insights and suggest solutions. Such networks can replace the traditional hierarchical model of centre-out knowledge dissemination with a ‘peer to peer’ model of knowledge sharing and development.

Communities of Practice usually cross geographic and organisational boundaries, and provide a route for knowledge sharing which cross-cuts official reporting lines. Many organisations set up one CoP for each domain of strategic knowledge.

**Deliverables and benefits**

The primary benefit of a CoP is to deliver greater working efficiency of the members by improving their access to the knowledge of others. A ‘reliability and maintenance community’ might for example set the following deliverable: “a reduction of 10% in planned maintenance time, through the development and sharing of good maintenance practices”

Communities of Practice often develop defining documents which describe the deliverables and benefits they expect from community collaboration. These documents include a charter (an agreement among the community core team on purpose and ground rules for the CoP) and/or a business case (an agreement between the sponsor and the leader concerning deliverables).
Method

Consider the following at each phase of the CoP lifecycle:

**Pre Start-up**
- A way of collaborating online e.g. tools for collaborating on documents and for online discussion;
- A charter or terms of reference which reflects the members’ view of the network objectives;
- A performance contract, business case and/or objectives agreed with the sponsor;
- Training for CoP leaders and moderators;
- A critical mass of members – larger communities are shown to be more effective;
- A mix of online discussion and face-to-face events;
- Discussion driven more by raising questions and problems than by publishing and promoting.

**Start-up**
- Define the scope either by a top-down or bottom-up approach (see tips below)
- Fulfil key roles (see above)
- Hold a launch meeting to define a CoP charter and/or business case and define key knowledge topics (sub-domains);
- Secure an online CoP site/resource.

**Growth**
- Brand and advertise the CoP;
- Expand community membership and invite / elect Subject Matter Experts;
- Finalise the topics (knowledge sub-domains) for practice exchange;
- Begin to populate the CoP site e.g. start an online discussion;
- Hold a physical or virtual CoP meeting around a topic;
- Transfer Quick Win practices and promote quick win results;
- Report progress to the sponsor.

**Mid-life**
- Get feedback on application of Best practice;
- Collect documented examples of business benefit;
- Report value delivery to sponsor;
- Identify CoP knowledge gaps;
- Develop and monitor community metrics and periodically run community health check;
- Create recognition scheme for good contributors;
- Develop long term plan plus a succession plan for leadership roles.

**Close**
- Gather data on CoP decline;
- Investigate root cause of decline through discussion with the core team and members;
- Discuss these with the sponsor, and agree how to respond;
- If applicable, re-focus or re-launch the CoP;
- If applicable, archive community knowledge base and close discussion;
- Collect lessons learnt on community management.
Who is involved?
The following people, roles and structures are recommended:

- A **sponsor**, who provides direction and funding for the CoP;
- A **community leader**, accountable for ensuring the community functions as a knowledge sharing mechanism and delivers value to the organisation;
- A **community moderator**, who plans and facilitates CoP meetings and discussions (the same person may take the leader and moderator roles);
- A “**core group**” of CoP members, who support the leader in developing the CoP;
- **Community members** in general, who both contribute and re-use shared knowledge;
- **Subject Matter Experts**, accountable for specific sub-domains, who gather and maintain current best practice and Knowledge Assets, and they act as custodians of the company’s knowledge of their subdomain;
- **Focal points**, who act as specific CoP champions in various divisions, countries or other organisational units.

When should it be used?
A CoP should be considered wherever the knowledge is important to the organisation and there is a sufficiently large number of people (ideally >100) working in the same domain of knowledge, but in different organisational divisions or different countries.

Potential CoPs can be identified by asking:

- What do we need to know to do our business now and in the future?
- What is the core knowledge for new areas of business and growth areas?
- What are the crucial competencies and core knowledge assets?
- Who works with this knowledge on a day-to-day basis?

CoPs could be valuable for:

- Domains of “technical knowledge” e.g. Thermodynamics and Avionics;
- Domains of “practice knowledge”, e.g. project management and flight testing;
- Domains of “product knowledge”, e.g. a/c interiors or flight desk design.

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**Example**

![Diagram of CoP-related roles in Bombardier Aerospace](image-url)
**TOP TIP**

**The top-down approach** to communities consists of selecting knowledge areas which are strategic to the business and proactively starting up communities to cover those knowledge areas. The communities are chosen to promote transfer of knowledge which will deliver business results in line with business strategy. The client should be able to complete the sentence “by forming the ...community, we will increase our application of knowledge of..., leading to an improvement in business results of ...” If they can’t complete the sentence, then you don’t have a direct link between community formation and business performance.

**The bottom-up approach** can be run in parallel with the top-down approach. Rather than choosing strategic communities to promote, the idea of the bottom-up approach is to increase connectivity in the client organisation and to watch for communities emerging. Put people in touch with each other by ensuring they can find other people with similar skills and interests, by ensuring that communication is easy and straightforward. Promote networking, collaboration and introduce internal conferences and symposia. Then stand back and see which groups take advantage of the ease of communication by forming communities.

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**You know it’s working when...’**

Signs that a CoP is working include:

- Evidence of value delivered through sharing and re-use of knowledge;
- Growth in CoP in membership;
- The CoP knowledge base is well populated and well-used;
- There is active community discussion, with many questions raised and answered;
- As word spreads, requests are made for more CoPs in other knowledge domains.
Enabling Collaboration

ENTERPRISE SOCIAL NETWORKING

Also known as Online Social Networks.

What is this tool?

There is a strong link between communities of practice and social networking tools, as CoPs can make effective use of social technologies to achieve their objectives. Increasingly, businesses are using tools with 'social' features for the purposes of facilitating conversations between people who may not otherwise come into contact. Social features include the ability to;

- Create online content (text, pictures, audio and or video) which can be widely broadcast;
- Tag content with various metadata tags;
- Follow, comment on, “rate” and/or reply to the content of others;
- Create a personal online profile, describing your areas of knowledge and expertise.

Deliverables and benefits

Social networking can provide:

- Access to an entire workforce, with all the skills, knowledge and experience within it by enabling:
  - One-to-one;
  - One-to-many and;
  - Many-to-many communications.

- Public involvement in these conversations (unlike email, where conversations are inaccessible to others);
- Improved situational awareness across the workforce. Which in turn can lead to the following benefits:
  - Reductions in the time taken to find ‘the right person’;
  - Reduction of duplication of effort;
  - Faster communication;
  - Improved employee engagement.

Social networking can deliver improvements in performance of the kind that KM seeks to enable:
  - Faster planning and execution; cheaper like-for-like activities; reduced waste; improved safety etc.

Who is involved?

Note Many roles identified in Communities of Practice are valid for social networking tools. There may be an increased emphasis on the community leader and moderator to ensure the community is sufficiently animated – especially at early stage adoption. The following may be important for social networking tools development and use:

- Users – the majority of people engaging with the system whose input will be essential in winning their support for its subsequent use;

Method

Introduction of enterprise social technology is likely to include the following steps:

- Develop an enterprise social strategy, based on business need;
- Create business use cases;
- Evaluate tools against the use cases, and select a tool;
- Decide which components of the tool to enable/disable;
- Define a social media policy, including aspects such as information security and online etiquette;
- Select and engage early adopters
- Grow user engagement through marketing and gamification;
- Integrate with applications and work processes;
- Monitor and report usage.
• **Super-users** – early adopters who can provide coaching for others;
• **CoPs** – Communities of Practice should adopt social tools where these are effective platforms for online discussion forums and Q&A functionality;
• **IT department** – providing support for the tools, and training in their use.
• **KM manager or team** – to ensure that KM capabilities are considered throughout (i.e. CoPs).

**When should it be used?**

Enterprise social networking should be used where there is a business need to improve informal communication across organisational boundaries. Adoption of a social tool should begin with a series of use cases to decide which social tool to adopt. Typical use cases may include;

• A **project** using a social tool to develop informal internal communication such as development of a project blog, task assignment, reporting through social tools and cross-project awareness of the progress of work;
• A **community of practice** using social tools for online question-and-answer, for the collaborative creation of community knowledge assets such as practice descriptions.
• Creating **personal profiles** so that individuals can make their knowledge widely available and findable to others.
• Enabling **question and answer** to rapidly solve a problem or issue.

Organisations should avoid the tendency to “introduce social tools and see how they are adopted” (i.e. introduction with no clear business purpose). As social networking is closely linked with specific technologies, there is a risk of “technology push” as opposed to “business pull”, which can affect adoption.

The potential benefits of social technologies are directly proportionate to the size and spread of the host organisation. The larger and more disparate the organisation, the greater the likely benefit from some form of social networking capability.

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**TIPS**

The tools themselves are one enabler within a KM framework. The other enablers – people, processes and governance – must also be addressed to ensure that:

• Potential users are involved in the development phase;
• The new system’s purpose is communicated and understood;
• Users are trained in its correct use;
• Leaders lead by example and encourage and support their colleagues to do the same.
Enabling Collaboration

Example

Airbus Group has an internal social networking solution integrated as part of the “HUB” which also doubles as the corporate intranet and communications platform. The HUB is open to anyone with an Airbus login to participate in and/or follow one of 100+ open communities. Communities are organised by domain, project or interest area. Below a screenshot from the KM community:

You know it’s working when…’

Signs that social networking is having the desired effect include:

• Email usage decreases as people begin to use social tools for conversation;
• People move from seeking answers only from those alongside them in the office to targeting their queries to people across the whole business;
• Feedback loops shorten as more people are able to engage with initiatives more quickly, especially those whose voices are not normally heard;
• There is a high adoption and usage rate.

TOP TIP

Collaboration code of conduct: Most people are able to collaborate sensibly in the workplace however social tools can occasionally be used inappropriately. Some form of moderation may be required but this must not be too heavy-handed or it could kill off any social networking that might otherwise take place. Some suggestions are as follows:

• Avoid anonymous profiles – people will usually remain polite and professional if all can see who is saying what;
• Allow communities of practice to develop their own codes of conduct – for example, avoiding personal criticism;
• Allow people to publish openly – but ensure that ‘sign-on’ reminds people of the terms and conditions of participation, including the need for maintaining security where appropriate and respecting all other users;
• Retain editing rights – whilst allowing people to write and say what they like encourages self moderation and professional behaviour, it is sensible for a moderating team to be able to respond to complaints or requests for certain content to be edited or removed;
• Avoid too much top-down governance – in one organisation, they moved from free discussions (whereby anyone could initiate a topic on any subject) to ‘sponsored discussions’ where senior approval was required in advance. During the 3 years of ‘free discussion’, over 600 discussions were initiated; during the subsequent 2 years, this number reduced to 6.
Also known as Shared folders, Team spaces, Content sharing.

What is this tool?
Document sharing is where multiple individuals can access and edit a single document. Based upon the idea that people work together better if documents can be openly shared instead of being retained only by individuals or teams. Shared storage can be enhanced by real-time collaboration where many staff can edit the same document, often at the same time as each other.

Deliverables and benefits
Document sharing can enable:
- Richer, more valuable knowledge from multiple authors;
- Knowledge that reaches all parts of an organisation instead of being stuck in one discrete area;
- Reduction in the time taken to find the right document;
- Access to documents from any device;
- Protection of documents against hard-drive crashes or laptop theft;
- Reduction in the amount of bandwidth and/or data transmission required by sharing documents via hyperlinks instead of attaching them to emails.

Real-time document collaboration can additionally enable:
- More rapid production and review of documents;
- Better document quality;
- Better process visibility;
- Ability to brainstorm remotely.

Who is involved?
The following roles are suggested when developing a shared content system:
- The knowledge or content owner – accountable for managing content for a particular topic within the shared document repository; ensuring the knowledge is synthesised, findable, up to date and useful. This role may vary between authoring the content, editing the content, or facilitating the collaborative process.
- Other roles include: Document management administration team, librarians, taxonomist, information architect(s) and IT support.

Method
IT departments usually control storage structures and access at the highest level. Where flexibility is permitted lower down (i.e. at department or team level), the following method can help create a shared folder structure. Shared content can be created by following the guidance outlined below:
- Where a Taxonomy or filing structure already exists, use that;
- Hold a workshop (or several) at which team members can discuss the different content types and how they are usually used;
- Establish agreement over some basic rules:
  - Will inputs from outside the team be stored in the same folder as outputs from it?
  - How will content type, originator and/or destination be reflected?
  - What process will be used to create and name ‘new folders’?
- Discuss as many use-cases or scenarios as possible i.e. if we receive a training report from Team X, does this get stored under ‘training’, ‘reports’ or ‘Team X’? etc;
- Identify the most commonly used documents (IT may be able to provide data to help here) as shortcuts to these should be created for the highest folder level;
- See also Electronic 5S.
Enabling Collaboration

**When should it be used?**

Sharing documents through online platforms is required for any team or groups working together who need to access to the documents of others. Especially when there are multiple stakeholders/contributors that need to agree on content in short cycle time.

The LCB resulted in a standard set of tools and a process for all staff to use when starting a new bid or project. The LCB directory is hosted on SharePoint and users access the system via the front page as shown below:

![LCB Directory](image)

**Example**

**QinetiQ PEN**

Process Expert Networks, or PENs, are cross-Sector teams driving improvement relating to specific processes or tools, to help QinetiQ deliver better business performance. A PEN is implemented by people working together and their combined Knowledge Management is supported by use of SharePoint tools.

An example of a PEN was the introduction and continuous development of the Life Cycle Briefcase (LCB) which established a single point repository of information for all QinetiQ bids and projects. Under this project a standard lifecycle was defined with decision gates at key project milestones.

Clicking on the “my briefcases” page accesses a list of all relevant briefcases that the employee has a stake in and the role they have in that briefcase (for example, either as owner, member, reviewer etc.)

![Example Briefcase](image)

**You know it’s working when…**

Signs that the use of content sharing is having the desired outcomes include:

- Creation, review and checking time for documents decreases significantly;
- The number of multi-authored documents increases;
- The quality of ‘outputs’ increases through a broader range of inputs (or like for like comparison shows that the same quality can be achieved more quickly);
- People start to move from seeing work as belonging to them to belonging to ‘us’.

**TOP TIPS**

Document collaboration can be an enabler to promote other forms of collaboration through a central team space or shared area where other types of information are shared e.g. shared calendars, lists or shortcuts. If people are accessing a space to edit documents then the other content can be presented in the same space in order to promote it.

To avoid duplication and aid consistency, different knowledge topic areas could be aligned across the company-wide taxonomy, communities of practice, document sharing and ownership; the leaders of which and/or subject matter expert members, should own the knowledge therein.
COLLABORATION TIMES AND SPACES

Also known as innovation space, wikithons, BarCamp, Obeya room ‘Freedom Fridays’, ‘Knowledge cafes’.

What is this tool?
Some organisations have locations or events which employees are freed from the usual work constraints and encouraged to collaborate with others within their place of work. At its heart is the idea that a defined space for collaboration will enable people to be more creative that the collaborative relationships that will be created will, in turn, strengthen and enrich the wider business.

This section will focus on the use of physical spaces in which to foster collaboration and innovation, and will also mention creating specific ‘collaboration times’ for the same purpose.

Deliverables and Benefits
The outcomes from collaboration spaces (and times) can be:
• New relationships that span the usual functional interfaces, both horizontal (i.e. between teams or departments) and vertical (i.e. between employees of significantly different seniority or experience);
• Shared experiences;
• Innovations that improve productivity.

The benefits can include:
• The development of a culture that is flexible, fluid and open to change and new ways of working;
• New ideas, and combinations of ideas;
• Greater employee engagement.

Who is involved?
Collaboration spaces vary. Where the decision to use this approach has been made it should apply to everyone within the team or department, as failure to include all may result in negative perceptions (from excluded colleagues) or loss of momentum Where a specific event is planned, a facilitator or coordinator role can help. This role involves design of the event, oversight of the event principles and process in order that the event will deliver the required objectives.

When should it be used?
Collaboration spaces can help under the following circumstances;
• When the business has become “stuck in a rut” and needs to think more innovatively;
• When a culture of isolation needs to be replaced by a culture of collaboration;
• To break the ice between members of a community of practice meeting or the first time;
• To create new ideas and innovative approaches;
• Where a product, solution or strategy requires consultation and input from many people;
• To improve employee engagement;
• To collect and create content for a community wiki.

Variant
BarCamp – this is a format for user-driven conferences that enable participants to share and co-create knowledge, primarily relating to web applications and other online technology. Participation (as opposed to attendance) is compulsory, as is the generation of material throughout the event which is then shared with all participants. The focus is on intense collaborative effort.

You know it’s working when…
Signs that the creation of Collaboration spaces are working include:
• People start to look for new solutions to problems instead of doing things the way they have always been done;
• People seek to extend the windows within which the new freedoms apply and/or continue the conversations during the ‘normal’ working week.
**Example**

The images below are from the Thales collaborative Design Centre in Glasgow. The centre, which is one of only two in the UK and five globally, is already creating benefits for the Land and Air systems business in the UK. The Design Centre enables employees and customers to step out of their usual environment and develop ideas in a dedicated space designed to facilitate innovation.

Barry Connor, Technology & Innovation Manager, Optronics UK, commented “I’m delighted at the positive feedback we’ve had; we felt it important to underline that this isn’t about “design” in the traditional engineering sense but is more about creating an environment to foster lateral thinking to create solutions for any of the challenges facing our business.”

---

**TIPS**

Collaboration space initiatives vary widely. Regarding physical spaces, the following can be considered:

- Comfortable or unusual seating that gives people the opportunity to interact differently to the normal office space;
- White-boards, white-walls and flipcharts to allow spontaneous illustration of ideas;
- Books and journals of an ‘eclectic mix’ (i.e. not technical tomes but quirky, alternative perspectives on some of the issues within the workplace);
- Lego™ or other building toys or materials that allow ideas to be communicated physically;
- Different colour pens/paper and paper scraps for doodling.
SUCCESS FACTORS

What sort of things enable collaboration? What are the keys to success? What factors need to be considered? Below are some suggestions.

People
• Seek to meet in person, or conduct video-conferences at the start of any collaborative effort;
• Identify the stakeholders that need to be engaged, and develop a communications and engagement plan.
• Find independent skilled people to facilitate collaborative processes, both face to face and online. They can help with drawing up terms of reference, designing the processes, and ensuring the processes deliver against their objectives.

Leadership
• Ensure senior managers support and promote collaborative efforts and structures. If leaders are to engage with their colleagues online, this must be done in a way that reduces friction and the reliance on ‘rank’ or ‘function’.
• Develop a clear, persuasive business case for collaboration which clearly makes the case for investment in collaborative tools, processes and roles.
• Address the issue of charging mechanisms. A sponsor providing a budget for an off-site residential 2 day kick-off meeting for a CoP, for example, is a clear sign from the top that collaboration is sanctioned from the top.

Culture
• Recognise the culture change needed for collaboration, and be prepared to support this with incentives.
• Introduce collaboration with other Knowledge Management initiatives, such as learning from projects. Ensuring that experts compile knowledge into best practices and other guidance.
• Share accountability for collaboration among many people (such as CoP core teams). Since collaboration is the attempt to bring diverse groups together, accountability should be shared amongst them, so as to achieve ‘strength in depth’.

IT/Security
• Seek IT input at the start of any effort to introduce collaboration. IT personnel have much valuable experience and failure to consult them can jeopardise any collaborative project. Crucially, they can provide a valuable ‘reality check’ to any overly-ambitious initiatives.
• Ensure the rules regarding information security are clear, and promote the default that “knowledge should be openly shared unless the rules clearly show that it shouldn’t“.
Suggested areas for monitoring and measuring collaboration are shown below:

**Activity:**
- Number of meetings (physical, virtual);
- Number of online discussions;
- Time elapsed since last online engagement.

**Maturity:**
- Number of followers, community members, active contributors to discussion;
- Number of questions answered;
- Number of networks and/or forums;
- Age/diversity breakdown;
- Number of votes or ‘likes’ of posts, online articles (i.e. user feedback);
- Strength of online profile (i.e. votes indicating credibility and/or support from users).

**Impact:**
- Number of issues resolved and/or objectives met;
- Time/cost breakdown.
# REFERENCES AND FURTHER READING

<table>
<thead>
<tr>
<th>Title</th>
<th>Author(s) (where appropriate)</th>
<th>Publisher or link (where appropriate)</th>
</tr>
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<tbody>
<tr>
<td>Realising the Promise of Corporate Portals’</td>
<td>Jose Claudio Terra and Cindy Gordon</td>
<td>Butterworth-Heinemann, 2003, Burlington, MA, USA</td>
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<td>Designing a Successful KM Strategy</td>
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<tr>
<td>Gartner News Release</td>
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<td>News release “Gartner says the vast majority of social collaboration initiatives fail due to lack of purpose”</td>
</tr>
<tr>
<td>The pocket guide to organising your own BarCamp</td>
<td></td>
<td><a href="http://barcamp.org/w/page/404135/OrganizeALocalBarCamp">http://barcamp.org/w/page/404135/OrganizeALocalBarCamp</a></td>
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Finding and Structuring Knowledge

Overview
Capturing knowledge serves little purpose if it cannot be found by others who need it. Even if aerospace organisations recognise the value in capturing knowledge for future re-use, many have yet to structure, tag and store for easy retrieval.

People often contrast knowledge-seeking at work and knowledge-seeking on the World Wide Web, asking “Why can’t we have Google in the workplace”. Most people can find things online in their leisure and social lives very easily, but this is a result of many factors such as:

- the prevalence of Search Engine Optimisation on the world wide web;
- the vast investment that has gone into Google;
- the financial incentive online companies have to make their services findable;
- our behaviour as online consumers, which is not the way we behave as employees as the rewards and incentives are different.

Finding knowledge will always be easier if the person storing it considers findability by the end-user. This requires everyone who captures knowledge to put themselves in the shoes of someone who needs that knowledge and asking themselves, ‘how might they look for this and how can I help them to find it?’

Note: once knowledge is documented it can also be considered as information and therefore many of the challenges documented here are shared with information management.

QUESTIONS ANSWERED IN THIS CHAPTER

- What knowledge should we be storing and why?
- How do we balance access with security?
- Why can’t we have Google in our company?
- How do we encourage people to seek knowledge?
- What tools and technology should we use?
- How should stored knowledge be structured and tagged?
- Who should own &/or validate stored knowledge?
- Where and how do we start?
- How do you make knowledge easy to find?
TOOLS INCLUDED IN THIS CHAPTER

- **Knowledge Mapping**
  A process to identify and structure the main knowledge topics and subtopics in a domain and to represent dependencies or relationships between them.

- **Search Tools**
  The technologies used for finding and retrieving documented knowledge.

- **Taxonomies and Ontologies**
  Are the means to formally classify (or categorise) information that may enable future searching or browsing.

- **Controlled Vocabulary**
  An agreed set of terminology used in describing a knowledge domain that ensures an agreed understanding and definition as well as consistent application of terms.

- **Lean Electronic Environment (e5S)**
  An electronic version of the lean workplace approach to ensure lack of clutter and immediate availability of information.

**Relevant Keywords**

- Categorisation
- Category
- Classification
- Enterprise Search
- Finding
- Glossary
- Hierarchy
- Index
- Lean
- Lexicon
- Mapping
- Organising
- Retrieval
- Search
- Seeking
- Semantics
- Storage
- Structuring
- Workspace
Also known as Concept mapping, Structuring knowledge.

What is this tool?
Knowledge Mapping is an investigative process through which the main knowledge topics and subtopics are identified and structured, to represent dependencies or other relationships between them. It is an enabling activity on which other tools or actions may depend, and is often undertaken in order to develop a taxonomy (see next).

Deliverables and benefits
Knowledge Mapping can deliver the following:

- It can reveal to its authors the complete array of knowledge topics with which an individual, team or department works;
- The knowledge map can be used to set up a multi-level taxonomy;
- A clear visual representation of the way different topics relate to one another;
- A list of identified experts or process owners can be created, with each of ‘their’ topics listed against them (see Expertise Search);
- The basis for prioritising further KM actions e.g. Topic Based Risk Assessment.

This can lead to the following benefits:

- Identification of dependencies between topics;
- Identification of mutual interests (since one topic might have numerous contributors);
- A clearly browse-able structure for folders;
- A taxonomy based on a robust structure.

Who is involved?
Knowledge Mapping should be done by people with KM roles (i.e. knowledge managers, analysts, engineers etc.) in consultation with all known experts in each topic, in order to make the output as accurate as possible.

When should it be used?
Where no existing knowledge structures are defined. Knowledge mapping should be used to organise and structure knowledge and make it readily retrievable for other people to find and re-use.

Knowledge Mapping may also be done at the beginning of an expert individual or team Knowledge Capture or Knowledge Transfer exercise to ‘scope’ out the knowledge.

You know it’s working when…’
A successful knowledge map will enable follow-on activity such as the identifying gaps in codified knowledge (i.e. thereby triggering Knowledge Capture and the creation of Knowledge Assets), the creation or updating of Taxonomies and the creation of, or updates to, online storage of knowledge, so as to facilitate its quick retrieval.

TOP TIP

- A knowledge topic can span several functional areas and it may be necessary to speak with expert in different teams and departments in order to build up an accurate picture.
- The scope of knowledge mapping topics may be related to specific aircraft components, functional areas such as airworthiness, human factors or processes such as design, procurement and bidding.
- When interviewing individuals, it is helpful to ask them to list the various sources and repositories they use, both within the organisation as well as external to it. You can then cross-check the structure of these repositories with your knowledge map.
Method

Some organisations already have knowledge maps in place and it is worth checking to see what already exists before creating something new. The following steps will help to create one:

- Workshops are the best way to quickly achieve a consensus, perhaps using facilitation if the relevant expertise is not readily available internally;
- Define the high level scope in a short statement of 1-2 words to start the map;
- Identify Tier 1 sub-topics by asking “what would I need to know to know everything about topic above?”
- Repeat for Tier 2 topics;
- Continue until the required level of detail is reached – usually 2-3 levels are sufficient for an initial structuring;
- It’s a good idea to use mind-mapping software or concept-mapping software, and to update it during the meeting;
- The role of the facilitator is to ensure agreement over the structure and to challenge when topics do not appear to fit the logic of the chosen structure
- Publishing – once inconsistencies or errors have been ironed out, the knowledge map can be published. It is good practice to include an author, date of publication and a date for the next review;
- Review and updating – the knowledge map should be reviewed periodically, to ensure it remains relevant.

Example The outline structure of a fuel system knowledge map is shown below, courtesy of Airbus:
A range of search tools have evolved to meet the demand of companies managing vast amounts of data.

KM policies and procedures as well as technical input for example for knowledge/information structuring approach. Large organisations may employ or contract a search specialist.

**When should it be used?**

The procurement of specific search technology should be considered when the search tools integral to current software packages are no longer considered fit for purpose. For example, merger with another business may result in an increased number of knowledge repositories which, over time, will lead to inefficiency as the recently increased workforce become less productive through longer, multiple searches.

**Who is involved?**

Procuring and implementing a search tool will involve close interaction between the business and the IT department. KM participation may help to define
Method

The array of search technology is enormous. This section will examine a number of features, none of which are mutually exclusive:

- **Enterprise search** – this enables a user to search across different sources (e.g. databases, portals and other systems) whilst respecting permissions and other access criteria;
- **Semantic search** – this kind of search reflects a level of understanding of meaning and/or the user on the part of the tool being used. It enables both user intent and context to determine the content of search results and the order in which they are displayed;
- **Customised search** – this enables a user to refine the criteria used for searching, through both the kind of content to be interrogated and the metadata used to shape the results; search queries can often be saved and re-run as reports if required;
- **Suggestions** – a search engine may suggest search strings, or autocomplete your search, based on other popular searches;
- **Search can be linked with auto-classification**, e.g. the BBC uses an auto-classification tool which is integrated into the story-filing interface for its journalists. As the journalist types their story, the system recognises the names of people, places and organisations using a reference taxonomy, and uses the search engine to automatically add links to prior stories about those people, places or organisations.

Example of a search from the Airbus Project Management reference library with different classification taxonomy displayed on the left to help facilitate search (search vectors).
Finding and Structuring Knowledge

**PEOPLE SEARCH**

*Variation on Search tools*

**What is this tool?**

In addition to the technology used to search for published content, it is equally valid to identify tools used to help connect people with one another. It is estimated that over 80% of knowledge is not documented and therefore only known by people.

**Key differences**

Many aerospace organisations now have the equivalent of ‘internal ‘Yellow Pages’ or ‘Expertise search tools’, with which users can create their own profiles, which they populate with previous experience and a list of skills or knowledge topics that they can share with others.

Like commercial networking websites like ‘LinkedIn’, such tools enable users to perform customised searches for people that, in this case, may have knowledge that they would like to access. See also Enterprise Social Networking.

**TOP TIP**

There is a school of thought that says that the way knowledge is organised is irrelevant, as long as organisations invest in powerful search tools and apply lots of rich metadata to all published content. There will always be a need for a ‘browse’ function, whereby one can simply see what is out there. Search only delivers answers to questions, while structured browsing allows you find things you didn’t know existed (and therefore would never search for). Advanced search technology should not become a substitute for an organised approach to knowledge structuring, for example as knowledge assets.
TAXONOMIES AND ONTOLOGIES

Also known as classifications, hierarchies.

What is this tool?

<table>
<thead>
<tr>
<th>Ontology</th>
<th>Taxonomy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definition</td>
<td>Formal description of a domain</td>
</tr>
<tr>
<td>Contain</td>
<td>Concepts, semantic relations, attributes, instances</td>
</tr>
<tr>
<td>Function</td>
<td>Description, conceptualisation, modelling</td>
</tr>
<tr>
<td>Formalisation level</td>
<td>High</td>
</tr>
<tr>
<td>Use cases</td>
<td>Knowledge Management, Semantic search</td>
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<tr>
<td>Aerospace example</td>
<td>Fuel system concepts and relationships</td>
</tr>
<tr>
<td>Non-Aero example</td>
<td>Family tree</td>
</tr>
</tbody>
</table>

Both make it easier to access information content

Deliverables and benefits

A classification system such as a taxonomy can deliver the following:

- Classification of data, a clear visual representation of the way different functions, topics or other concepts relate to one another.
- Metadata that can be used to store, and subsequently retrieve, knowledge e.g. faceted information search and search results refinement.

An ontology can be used for: identifying items for Knowledge Management (see also Knowledge Mapping); Terminology management, Semantic search or Information search improvement.

This can lead to the following benefits:

- Identification of dependencies between entries;
- Clarity of ‘ownership’ since entries within a taxonomy cannot appear in two place at once.
- More effective and less time-consuming searching and browsing for knowledge and related information.

Who is involved?

A classification system such as a taxonomy should be produced in consultation with all departments and teams whose responsibilities will be represented within it. This is an essential point – no-one knows better what their job entails than the people doing it.

When should it be used?

A classification system such as a taxonomy or ontology should be used when seeking to organise and structure knowledge and make it readily retrievable for other people to find and use. Knowledge assets (i.e. lessons, guidance, good practice etc.) should be categorised according to one or several of these classification methods as this will aid analysis and retrieval. Knowledge content should be categorised and ‘placed’ within the classification system on creation or as part of validation.
Method
Many organisations have taxonomies and/or ontologies in place and it is worth checking to see what already exists before creating a new one. Certain aerospace taxonomies are well defined in standards e.g. ATA Chapters.

Further guidance

- Taxonomies are an imperfect tool, because they are an artificial structure placed upon the messy, moving reality of human interaction and experience. Therefore the simpler we can make them, the better.

- Duplication in a taxonomy should not happen but, if it appears to do so, explore why it is there as it might reveal duplication in the underlying organisation (intended or otherwise).

- Taxonomy ‘codes’ can be used to represent each individual element within the taxonomy and its relationship to others (i.e. HR might be coded 10 and Learning & Development (i.e. within HR) might be coded 11, and Pay Conditions coded 12 etc.). Particularly useful for organising folder structures – see Electronic 5S.

You know it’s working when…’

The main indicator of a successful classification system is a reduction in the time taken to retrieve knowledge and related information for re-use. Signs that it is helping might include analysis to identify the ‘hot spots’ or problem areas – for example more lessons learnt created within a certain tagging from the taxonomy or those that are not used all.
What is this tool?

Folksonomy is a categorisation method of content, including knowledge, through the bottom-up aggregation of tags suggested by the authors. A folksonomy could be considered as a ‘crowd-sourced’ taxonomy.

Key differences

Whereas a taxonomy is formally and created in a structured, deliberate way, a folksonomy is informal and grows ‘organically’ as users interact with the content and ‘tag’ it in a way that makes sense to them. As such, whilst it may reflect the way users actually use and view content, this may mean that it is prone to trends, “groupthink” or other inconsistencies.

TOP TIP

• Within a Knowledge Management context, a consistent taxonomy should be used across all elements. The Communities of Practice should correspond to the top level of the taxonomy, with a community of practice and practice owner for each high level knowledge topic. The same taxonomy or ontology should be used for the lessons management system and should control the structure of the main knowledge base (knowledge assets).

• Whilst a taxonomy will often be shown as a list of functions and sub-functions, other modes can be helpful to communicate the relationships within it to all those that will be using it. For example, a visual approach might be used, with each function and sub-function shown diagrammatically. Icons, diagrams or other images can be used to bring the taxonomy to life and make it easy to understand.
Also known as Lexicon, Glossary, Index.

What is this tool?
A controlled vocabulary is an agreed set of terminology used in indexing, metadata, taxonomy, ontology and file names. Without control, people will add their own terms to the vocabulary on an ad-hoc basis and the taxonomy will slowly lose its ability to bring together related resources as intended.

Deliverables and benefits
A controlled vocabulary can deliver the following:

• An agreed terminology in use across the enterprise, including any search tools;
• Consistency when writing technical documents where the need for clarity and 100% accuracy is paramount (e.g. ensuring people in different countries and departments use the same term to describe things);
• A resolution of multiple terms for the same item,
• A consistent set of metadata tags.
This can lead to the following benefits:
• Reduction in ambiguity when filing documents;
• Easier browsing;
• A reduction of ‘false hits’ during searching;
• A greater search success rate.

Who is involved?
The term ‘controlled’ means that there are defined roles (i.e. experts, process or practice owners etc.), rules, and processes for approving changes to the vocabulary, to ensure that the vocabulary and associated taxonomy continues to serve its intended purpose over time.

When should it be used?
A controlled vocabulary can be used to support an enterprise taxonomy and any search tools.

You know it’s working when…’
The main indicator of a successful controlled vocabulary is that it supports a successful taxonomy through the reduction of ambiguity in the terminology used.

Method
A typical process for creating a controlled vocabulary is as follows:

• Determine Scope;
• Identify Sources – experts, publications, department terminology, existing databases and classification schemes and search logs;
• Gather Terms – top-down through working with SMEs, or bottom-up by compiling and combining existing systems;
• Categorise Terms – organise terms into major categories such as parent/child relationships, preferred terms and non-preferred terms;
• Manage Terms – a taxonomy management tool or database can be used to manage terms;
• Visualise Terms – a graphical representation of the taxonomy facilitates SME review and validation of subject categorisation;
• Validate – use the SMEs to review and validate both the terms and their categorisation of terms;
• Plan for Maintenance.
Example

An example of where controlled vocabulary has been beneficial is Air crash investigations. Air crash investigations must use specified controlled vocabulary. This is to ensure that similar crashes and causes are identifiable from the report title and content.

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**Appendix 4 to Chapter 1**

**AVIATION TERMINOLOGY**

**INTRODUCTION**

This appendix comprises two sections. The first section is titled Descriptive Technical Terms and lists technical terms which have a specific meaning and an explanatory definition. The second section presents some commonly used Human Factors Terms.

**I. DESCRIPTIVE TECHNICAL TERMS**

*Aeretic.* Visible effects (burn spots, fused metal) of an electrical discharge between two electrical connections. Also: flash over.

*Battered.* Damaged by repeated blows or impacts.

*Bent.* Deviated from original line or plane usually caused by lateral force. Also: creased, folded, kinked.

*Carbonised.* Covered by an accumulation of carbon deposits. Also: carbon-covered, carbon-tracked, coked.

*Chaffed.* Worn by frictional damage. Usually caused by two parts rubbing together with limited motion.

*Checkered.* Cracked on the surface. Usually caused by heat.

*Chipped.* Broken away at the edge, corner or surface of the parent material. Usually caused by heavy impact; not filing.

*Collapsed.* Inwardly deformed original contour of a part. Usually due to high pressure differentials.

*Corroded.* Gradually destroyed by chemical action. Often evidenced by oxide build-up on the surface of the parent material. Also: rusted, oxidized.

*Crack.* Visible partial separation of material.

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**TOP TIP**

- There is a choice to be made between use of a controlled vocabulary or an uncontrolled, free-text vocabulary such as a folksonomy. Each has its advantages and disadvantages.
  - A controlled vocabulary makes it very easy for others to find knowledge, but makes it more onerous to store and classify documents, and requires a level of commitment and dedication.
  - A folksonomy is responsive to user needs and vocabularies and makes it easy for people to categorise documents in ways which are meaningful to them, but can result in a chaotic and ambiguous system, and tagging which makes sense only to the author (one of the most common tags in folksonomies of photographs is “Me”, for example).

- Make the choice based on your main problem - filing or finding. If people are not filing material at all, choose a folksonomy; if there is a lot of material but it is hard to find anything consider a controlled vocabulary. Folksonomies are also valuable in cases where the range of possible categories is very wide (photographs, for example, cover a huge range of topics), while controlled vocabularies are more valuable when categorisation can be very precise, such as categorising damage to aircraft components.
Finding and Structuring Knowledge

**LEARN ELECTRONIC WORKING ENVIRONMENT**

Also known as Electronic 5S (e5S).

**What is this tool?**

e5S is an electronic version of the lean workplace approach to ensure lack of clutter and immediate availability of tools and spares (SS). It is equally (if not more) important to apply the same principles to our electronic working environment. This can include: personal and shared drives, email accounts, SharePoint sites, intranets, databases, and anywhere else you store documents or information electronically. This approach removes clutter, noise and duplication in the knowledge base and arranges knowledge in logical and efficient way.

**Deliverables and benefits**
e5S can:
- Reduce errors, through clear version control and naming conventions;
- Identify and eliminate duplication;
- Identify and optimise efficient ways of working;

In turn, these can result in:
- Higher productivity;
- Increased time available for high-value activity.

**Who is involved?**

Turning the electronic working environment into a lean environment may be assisted by external facilitators e.g. internal lean change agents or external consultants or simply those within the organisation who have already adopted such an approach. Moving to the new way of working will be best achieved team by team, with colleagues adopting new practices together.

**When should it be used?**
e5S should be used to optimise the electronic working environment in all critical knowledge bases which are frequently used, and which require reorganising and de-cluttering.

**You know it's working when...’**

Signs that this new way of working is succeeding may include:
- Staff frustrations are reduced
- A consistent approach across your organisation is created
- The incidence of using out-of-date or incorrect documents is reduced.

**Method**
e5S is a 5 stage process, with each stage beginning with the letter S. For example, as follows:
- Set Standards, for example naming conventions and standard folder structures (folder titles should align to domain knowledge map);
- Sort documents, deleting duplicates and placing uncertain documents into a quarantine folder (they will deleted later if not accessed);
- Set documents into the new folder structure and rename them according to the new convention;
- Shine – defragment your hard-drives, empty your ‘deleted items’ folders, and reduce personal drive storage space;
- Sustain – Create a regular self-audit of your electronic environment.
Example

An outline of a methodology currently in use at an aerospace company is shown below:

**e5S: From Methodology to Mindset**

5S is a systematic approach to workplace organisation, encouraging **OWNERSHIP** and **SELF-DISCIPLINE** to sustain and further develop working practices. It supports the journey to a lean organisation through lean transformation of the physical and electronic work environment.

**TOP TIP**

- **E5S** can be easily communicated using a ‘supermarket’ analogy: knowledge can be organised logically in the same way that a supermarket will attempt to organise products for the benefit of shoppers e.g. flour could be expected under ‘baking’ and oranges in ‘fruit and veg’.
- Whilst lean approaches to storage and working spaces are underpinned by methodologies, a rigid adherence to them may alienate team members. Therefore, good communication at the start and throughout is essential and it is a good idea to get team members to discuss how they think such approaches should be implemented within their team.
- Leadership is also essential – if the team leader does not lead by personal example then the initiative will fail and breed resentment. Leaders must take part in the process with equal, if not greater, engagement as their colleagues.
SUCCESS FACTORS

What sort of things enable the finding and structuring of knowledge? What are the keys to success? What factors need to be considered?

Governance, ownership, leadership
• ‘Knowledge owners’ (i.e. experts) with clear accountabilities, will need to be identified and everyone in leadership roles will be expected to enforce the KM policies, not least through their own personal example.

Culture, discipline and user expectations
• How people save and store knowledge will show how well people are prepared to adhere to KM practices or how its value has yet to be effectively communicated to all. Clear, frequent two-way engagement with users is essential to creating the right environment within which knowledge can be shared.

Time, effort and cost to create, structure, maintain knowledge
• Set standards and be rigorous otherwise backlogs of unstructured material will quickly become unmanageable.

Multiple and legacy systems
• Mergers and acquisitions result in different systems (with the same purpose) being used throughout a company. Clear guidance can help address this issue until the systems are merged with a single enterprise taxonomy.

Balance between security/IP/legal constraints and access
• ITAR regulations and IP protection mean that access to some knowledge must be controlled. People need to think about a piece of work before they store it – who might benefit from this? How can I help them find it?

Incentives
• Engagement with users should clarify the mutual benefits available to all through the right kinds of behaviour.

Triggers
• Knowledge can be created and captured throughout both project and operational lifecycles. The ‘triggers’ at which this might and must happen should be identified, set out in a KM policy and communicated to all.

Naming conventions and templates
• These help users to work consistently to access and use other people’s knowledge. They are rarely perfect but regardless should be created with the end-user in mind and communicated to all.

Roles
• Organisations have identified a range of roles that enable the effective storage, structure and finding of knowledge, such as: experts, archivists, historians, librarians, analysts, knowledge engineers, data managers. The terms used do not matter but what does is that their function is performed by someone who remains accountable for it.
Suggested areas for monitoring and measurement are shown below:

**Activity:**
- Number of searches:
  - From where?
  - For what?
- Number of unsuccessful searches.

**Maturity:**
- % compliance with IM, KM of e5S policies;
- % projects re-using current knowledge;
- % projects adopting standard folder structure;
- Number of knowledge areas/topics;
- Number of new entries;
- % data sources connected to search tools;
- % relevance or quality of search results;
- % user satisfaction with search;
- Number of populated user profiles;
- Number of unique user profiles.

**Impact:**
- % IP or knowledge re-use;
- Value of knowledge found;
- Value of untapped data/knowledge stores;
- Time to competence for creating, structuring and searching for knowledge;
- Time before use.
## REFERENCES AND FURTHER READING

<table>
<thead>
<tr>
<th>Title</th>
<th>Author(s)</th>
<th>Publisher or link (where appropriate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Practicing Lean Fundamentals in an Office Environment</td>
<td>Drew Locher</td>
<td><a href="http://www.lean.org/common/display/?o=2215">http://www.lean.org/common/display/?o=2215</a></td>
</tr>
<tr>
<td>Ambient Findability: What We Find Changes Who We Become</td>
<td>Peter Morville</td>
<td></td>
</tr>
<tr>
<td>Organising Knowledge: Taxonomies, Knowledge and Organisational Effectiveness</td>
<td>Patrick Lambe</td>
<td></td>
</tr>
<tr>
<td>The Accidental Taxonomist</td>
<td>Heather Hedden</td>
<td></td>
</tr>
<tr>
<td>Search Patterns: Design for Discovery</td>
<td>Morville and Jeffery Callender</td>
<td></td>
</tr>
</tbody>
</table>
Implementing Knowledge Management

Overview

Introducing Knowledge Management into an organisation is like any development project it involves a series of stages from Design (current state assessment, strategy, framework design) to Prototyping (KM pilot projects) to Production (Roll-out). This chapter introduces a way to approach KM strategy and to understand the maturity of KM in the business.

Any KM implementation must understand and engage with the underlying organisational culture (or in a large organisation, subcultures). In this case culture means: common and widespread patterns of values, attitudes and habits of behaviours and thinking. These are habits they are largely automatic and are reinforced by the frequency with which they are seen in other people. This makes cultural traits self-reinforcing and hard to change.

For effective communications and change it is essential to have a very clear view of the traits and behaviours that both support or oppose your KM implementation goals. Once you have this view, you can target the specific cultural traits that you want to leverage or address, in both communications and change management efforts.

QUESTIONS ANSWERED IN THIS CHAPTER

- How shall we ensure that KM is meeting the needs of the business?
- How can we ensure KM is recognised and deployed in the business?
- How do we deliver a systematic approach to KM?
- How can we make sure everyone is aligned on the priorities?
- How do we monitor and evaluate KM?
- How do we know where we have improved?
TOOLS INCLUDED IN THIS CHAPTER

- **KM Strategy**
  Sets out the organisation’s use of KM as a way of supporting its commercial strategy.

- **KM Maturity Assessment**
  Provides an overview of what KM capabilities or practices are already in place within an organisation, identifies gaps, good practices and areas for improvement.

---

**Relevant Keywords**

- Assessment
- Audit
- Business case
- Capability
- Change
- Communication
- Framework
- Governance
- Health-check
- Implementation
- Maturity
- Pilot
- Plan
- Policy
- Practices
- Roll-out
- Stakeholders
- Standard
- Strategy
Implementing Knowledge Management

Also known as KM Implementation Plan, KM Policy, KM Governance.

What is this tool?
A KM strategy sets out the organisation’s use of KM as a way of supporting its commercial strategy. A KM strategy is often created in the early stages of KM implementation, once implementation is over it may be replaced by a KM Policy.

Deliverables and benefits
A KM strategy helps to focus the efforts and resources of the KM team, KM practitioners and other stakeholders in the business. It provides alignment and acts as a reference for implementing KM.

Who is involved?
Defining the ownership of KM can sometimes be problematic as it overlaps many different functional areas. Some companies may go so far as to appoint a CKO – Chief Knowledge Officer however more often the responsibility for KM falls to functions like:

• HR due to the links to people, competence and learning;
• Engineering/operations due to the need to focus on key technical knowledge areas.

In any case an overall sponsorship must be defined and support made available.

When should it be used?
When setting out to implement KM in an organisation for the first time or to refresh the KM strategy and approach.

TOP TIP
Much of the material that goes into a KM strategy will come from senior management, either through interviews or workshops. A useful supporting tool for strategy work is a SWOT analysis; much of the detail set out above can be obtained through identifying the following:

• Strengths – what are we good at?
• Weaknesses – what are we not good at?
• Opportunities – what is coming up that might help us in this initiative?
• Threats – what is coming up that might hinder us in this initiative?

You know it’s working when...’
If KM is more known in the business, the solutions are recognised and regularly applied. The maturity of the KM practices is increasing (see page 107).

“A Knowledge Management (KM) strategy sets out the organisation’s use of KM as a way of supporting its commercial strategy.”
Method

Produce the KM Strategy
A KM Strategy document should be elaborated to include vision, principles, business drivers, critical strategic knowledge, business case etc. (see Example description for more detail). This can be done via a series of interviews or workshops with senior stakeholders perhaps in combination with benchmarking of external organisations. The process may be facilitated by external consultants but must consider and make use of existing business context and objectives.

Develop a ‘KM Framework’
A KM framework ensures that the relevant enablers within each of People, Process, Technology and Governance have been considered. The framework will include any existing successful KM components present in the organisation and a set of new components to fill any missing gaps. The framework components include:
• The KM roles and accountabilities that will need to be in place;
• The KM processes that will need to be introduced;
• The KM technology suite that is required;
• The elements of KM governance.

For example:

<table>
<thead>
<tr>
<th>People</th>
<th>Processes</th>
<th>Technology</th>
<th>Governance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communities of Practice</td>
<td>Peer Assist</td>
<td>Discussion forums</td>
<td>KM strategy, KM Policy, expectations, monitoring, reporting, metrics, taxonomy, vocabulary, links to performance appraisals</td>
</tr>
<tr>
<td>Facilitators</td>
<td>After Action Review</td>
<td>Lessons databases</td>
<td></td>
</tr>
<tr>
<td>Knowledge Owners</td>
<td>Reviews, updates</td>
<td>Wikis, Knowledge bases</td>
<td></td>
</tr>
<tr>
<td>Knowledge Manager</td>
<td>KM planning</td>
<td>Search</td>
<td></td>
</tr>
</tbody>
</table>

Pilot projects
The piloting stage is a small “proof of concept” exercise where a single KM element to a single business issue can be applied. The components of the KM framework can be tested in the proof of concept exercises. Choose your pilots wisely – they should have a high chance of success, be able to demonstrate clear business value, a deliver lessons and evidence to improve the framework.

Stakeholder mapping
KM will mean different things to different people (and teams) and some stakeholders will be more naturally supportive than others. Such differences should be identified and tactics adapted to address them; this is known as stakeholder mapping and engagement. See KM Stakeholders within What is KM chapter. An output of this process could be a RASCI model and a communications plan (see next page).

Communications Plan

A KM communications plan will enable a clear link between the progress of the implementation project stages and the messages created and conveyed by the project team to ensure all stakeholders are kept informed with detail appropriate to their role and level of seniority.

For each of the main target audiences a key message is chosen a delivery method (or channel) is assigned, an update frequency is decided. This can generate interest in the project, maintain momentum and help negate any opposition.

Roll-out

The roll-out phase is when the KM framework is applied across the whole organisation, through training, coaching and briefing. Roll-out continues until the whole organisation has been trained and is able to comply with the expectations in the KM policy.

Example

A KM strategy should include:

- Vision: The vision should answer the following questions:
  - What will life be like in the new organisation, after KM becomes a way of life?
  - What will we be able to do then, which we can’t do now?
- Principles: these should explain the way in which KM will be implemented;
- Business drivers: these should explain why the business has chosen to implement KM;
- Critical strategic knowledge: Concentrating on the critical knowledge provides focus to the KM programme, ensures alignment with the business drivers and strategy. The critical knowledge topics to be identified are key areas of knowledge that the company either needs to retain to deliver their current business or acquire to deliver future business;
- Business case: A business case should have already been produced (see Making the Case for KM) and this can be referenced here. The case should be summarised, with specific reference to the ‘size of the prize’ (i.e. an estimate of the value that KM could bring);
- Scope: Sets out where the boundaries of the KM programme will be. Will it include the whole company or one division? Will it include partners, suppliers and customers? Will it include just operations or the support functions as well?
- Risks: A KM initiative in its infancy can easily be delayed or halted altogether if unforeseen events take over. By anticipating, and planning for, such risks, implementation stands a better chance of success.
- Opportunities: There may be upcoming events or activities to which KM could be allied, in order to facilitate its implementation (i.e. a merger; the launch of a new product or services etc.)

TOP TIP

- A KM Policy is a governance document introduced in the later stages of KM implementation, which where and how the organisation will be using KM, who is accountable and when KM should be used. The NASA KM Policy is available online at the following address: http://nodosi3.gsfc.nasa.gov/displayDir.cfm?t=NPD&c=7120&s=6 (And starts with the words “Compliance is Mandatory”)
Also known as Current state assessment, KM practices assessment, Health-check.

**What is this tool?**

A KM maturity assessment provides an overview of what KM capabilities or practices are already in place within an organisation, identifies gaps, areas for improvement as well as examples of good practice.

**Deliverables and benefits**

An assessment will deliver a detailed analysis of each element of Knowledge Management, including strengths, gaps and recommended actions, including a summary of the first steps to be taken.

The benefits of conducting such an assessment include:

- It enables gaps to be identified and remedial actions to be prioritised,
- It provides a baseline to measure progress in KM implementation.

**When should it be used?**

A maturity assessment should be used either before embarking on KM implementation for the first time or when there is a need to improve and/or increase KM capabilities already in place.

It is used to see what is already being done, what works well, where the barriers and gaps are and where the strengths are.

**Method**

An assessment can be conducted either through a survey, through workshops or in-depth diagnostic interviews of a range of staff throughout the relevant part of the organisation. They could also be implemented as a self-assessment if relevant guidance is provided.

The assessment should be made against a clearly defined standard. For each capability area found to be missing or immature, actions should be recommended to bring the performance up to the desired standard. These actions can be compiled in a list of tasks that can form the basis of an implementation plan if the decision to proceed with KM is made. Note that the desired standard need not be the highest standard depending on the local needs and objectives.

Once several assessments have been done then capability scores can be compared and represented in graphs and charts. This can also be done where different teams or department involved in the assessment produce significantly varying results. An opportunity may then exist to connect those areas wishing to improve their level of KM capability with other areas considered to have a good level in that capability.

**TOP TIP**

Maturity assessments can also be conducted for individual KM activities or processes of the KM Framework, such as communities of practice, cultural factors, or Lesson-learning. Re-run the assessments over time, using a consistent methodology, to measure progress.
Example

An example of a KM self-assessment maturity grid – this could also include the expected evidence required to satisfy the criteria.

<table>
<thead>
<tr>
<th>KM Self-assessment</th>
<th>Focus areas</th>
<th>0</th>
<th>2</th>
<th>5</th>
<th>8</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Learning Before</strong></td>
<td>‘Learning Before’ never occurs. All new pieces of work are based on what the relevant staff already know.</td>
<td></td>
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<tr>
<td></td>
<td>‘Learning Before’ is rare. Only a few projects or pieces of work will learn from others before they start.</td>
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<tr>
<td></td>
<td>‘Learning Before’ happens some of the time. It is neither unknown behaviour, nor is it routine nor expected. It occurs on an ad-hoc basis, or locally within the firm.</td>
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<tr>
<td></td>
<td>‘Learning from others before you start’ is accepted behaviour for most pieces of work. It is however not required behaviour, nor is there the requirement to act on the knowledge received.</td>
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<tr>
<td></td>
<td>‘Learning from others before you start’ is part of required business process and occurs as routine for all significant projects or new pieces of work. Any knowledge so acquired is acted upon.</td>
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<tr>
<td><strong>Learning During</strong></td>
<td>‘Learning During’ never occurs. Teams talk about delivery and challenge, but never about learning or knowledge.</td>
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<tr>
<td></td>
<td>‘Learning During’ is a rare. Only a very few managers and team leaders discuss what a team is learning.</td>
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<tr>
<td></td>
<td>‘Learning During’ occurs locally within the organisation, being applied at certain levels and not at others, or for certain tasks.</td>
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<tr>
<td></td>
<td>‘Learning During’ is accepted behaviour for most pieces of work, and is practised at most levels, but is not applied routinely, or is not embedded into business process.</td>
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<tr>
<td></td>
<td>‘Learning During’ is part of required business process and occurs by default in all projects, at all levels. Any knowledge discussed in the team is acted upon, and forward plans updated.</td>
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<tr>
<td><strong>Learning After</strong></td>
<td>‘Learning After’ never occurs. Any reviews of delivery, performance or projects have no element of knowledge capture.</td>
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</tr>
<tr>
<td></td>
<td>‘Learning After’ is a rare, and relies on the enthusiasm of the project leader or team leader. Results are often not easy to find or not easy to use.</td>
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<tr>
<td></td>
<td>‘Learning After’ either occurs locally within the firm, being applied at certain levels and not at others, or is widespread but gives results which are far from ideal from the point of view of re-use of knowledge</td>
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<tr>
<td></td>
<td>‘Learning After’ is accepted behaviour for most pieces of work, and is practised at most levels with reasonably good quality results, but there is room for improvement.</td>
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<tr>
<td></td>
<td>‘Learning After’ is part of required business process and occurs by default in all projects, at all levels. The process is an effective one, and the output is good quality lessons and actions which will improve the way work is done in the future.</td>
<td></td>
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</tr>
<tr>
<td><strong>Communities of Practice</strong></td>
<td>There is no sharing of knowledge through practitioner networks.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>‘Communities of Practice’ and knowledge-sharing networks are rare. Either networking is not a standard business process, or the majority if networks do not function as knowledge-sharing mechanisms.</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Either ‘Communities of Practice’ or knowledge-sharing networks are in place for some business activities, or else there are many networks but the delivery of value through these networks is questionable.</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>‘Communities of Practice’ are accepted mechanisms for knowledge sharing for many key business activities, but by no means all.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>‘Communities of Practice’ exist and are maintained, monitored, facilitated, and actively used, for all key business activities at all levels, and add real value through problem-solving and sharing best practices.</td>
<td></td>
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</tbody>
</table>
The sign of success from a KM maturity assessment is the confidence of senior management over how to proceed with a KM implementation project. Without this analysis, many KM initiatives will either fail outright or waste time and resources as they lack sufficient understanding of what is already in place and risk duplication of effort.
SUCCESS FACTORS

A Knoco Ltd. Global KM Survey\(^1\) in 2014 asked hundreds of organisations what had helped and hindered KM implementation. Its results are shown below:

### Enablers

<table>
<thead>
<tr>
<th>Enablers</th>
<th>Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Support from senior management</td>
<td>6.3</td>
</tr>
<tr>
<td>Evidence of value from KM</td>
<td>5.8</td>
</tr>
<tr>
<td>Championship and support from KM team/champions</td>
<td>5.8</td>
</tr>
<tr>
<td>Effective KM processes</td>
<td>5.7</td>
</tr>
<tr>
<td>Personal benefit for staff from KM</td>
<td>5.6</td>
</tr>
<tr>
<td>Easy to use technology</td>
<td>5.2</td>
</tr>
<tr>
<td>A supportive company culture</td>
<td>5.0</td>
</tr>
<tr>
<td>Clear KM accountabilities and roles</td>
<td>4.7</td>
</tr>
<tr>
<td>Incentive systems for KM</td>
<td>3.2</td>
</tr>
</tbody>
</table>

### Barriers

<table>
<thead>
<tr>
<th>Barriers</th>
<th>Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of prioritisation and support from leadership</td>
<td>6.0</td>
</tr>
<tr>
<td>Cultural issues</td>
<td>5.8</td>
</tr>
<tr>
<td>Lack of KM roles and accountabilities</td>
<td>4.9</td>
</tr>
<tr>
<td>Lack of KM incentives</td>
<td>4.7</td>
</tr>
<tr>
<td>Lack of a defined KM approach</td>
<td>4.6</td>
</tr>
<tr>
<td>Incentives for the wrong behaviours (inability to time-write KM, rewards for internal competition etc.)</td>
<td>4.2</td>
</tr>
<tr>
<td>Lack of support from departments such as IT, HR etc.</td>
<td>4.1</td>
</tr>
<tr>
<td>Insufficient technology</td>
<td>3.8</td>
</tr>
</tbody>
</table>

Note that the number one barrier and the number one enabler are the same – support from senior management. This is clearly vital to support any KM implementation.

Although culture, roles and incentives are seen as major barriers they are at the bottom of the enablers table. This suggests some things can be perceived as strong barriers but weak enablers. Culture, roles and incentives all relate to the engrained habits of an organisation. When your KM initiative is aligned with them, everything goes smoothly and their role as enablers is barely perceived. When your KM initiative is not aligned with them, they immediately produce obvious – and multiple – points of friction.

# REFERENCES AND FURTHER READING

<table>
<thead>
<tr>
<th>Title</th>
<th>Author(s) (where appropriate)</th>
<th>Publisher or link (where appropriate)</th>
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<tbody>
<tr>
<td>Key Words</td>
<td>Definition</td>
<td></td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>After Action Review (AAR)</td>
<td>A short team meeting to discuss recent performance and identify learning points.</td>
<td></td>
</tr>
<tr>
<td>Best practice</td>
<td>The approved and established way of doing something. In some organisations this will be mandatory. (See Good practice for comparison).</td>
<td></td>
</tr>
<tr>
<td>Business case</td>
<td>A structured argument for a course of action, including financial evidence (e.g. estimated Return On Investment).</td>
<td></td>
</tr>
<tr>
<td>Collaboration</td>
<td>Bringing together people and/or teams who do not normally work together for a specific purpose.</td>
<td></td>
</tr>
<tr>
<td>Communication channels</td>
<td>The varied ways in which a message can be delivered (e.g. printed newsletter, web-pages, video recording etc.).</td>
<td></td>
</tr>
<tr>
<td>Community of Practice (CoP)</td>
<td>A network of people formed and managed to share and develop knowledge with one another.</td>
<td></td>
</tr>
<tr>
<td>Controlled vocabulary</td>
<td>A list of words, carefully defined to help an organisation avoid confusion and achieve clarity in its management of content, information and knowledge.</td>
<td></td>
</tr>
<tr>
<td>Enterprise</td>
<td>The entire organisation. Used with reference to software or other capabilities, this term relates to the breadth of scope.</td>
<td></td>
</tr>
<tr>
<td>Experts</td>
<td>People acknowledged within an organisation as having a degree of technical authority and/or accountability within a specific knowledge area, subject or topic.</td>
<td></td>
</tr>
<tr>
<td>Elevator pitch</td>
<td>An elevator pitch, is a short summary used to quickly and simply define a process, product, service, organisation, or event and its value proposition.</td>
<td></td>
</tr>
<tr>
<td>Gamification</td>
<td>Attempting to influence online collaborative behaviours through approaches similar to those in video games, such as awarding points and badges, and allowing progression through levels.</td>
<td></td>
</tr>
<tr>
<td>Good practice</td>
<td>A recommended way of doing something. However, it remains optional and variation is permitted. (See Best practice for comparison).</td>
<td></td>
</tr>
<tr>
<td>Information Management (IM)</td>
<td>A discipline related to KM, IM.</td>
<td></td>
</tr>
<tr>
<td>KM</td>
<td>Knowledge Management.</td>
<td></td>
</tr>
<tr>
<td>KM assessment</td>
<td>A diagnostic tool for measuring the extent and effectiveness of KM capabilities within an organisation.</td>
<td></td>
</tr>
<tr>
<td>KM framework</td>
<td>A holistic approach to KM, by which people, processes, technology and governance ensure that knowledge is captured, shared and re-used.</td>
<td></td>
</tr>
<tr>
<td>KM pilot</td>
<td>A small project during which new KM tools and processes can be trialled before wider roll-out.</td>
<td></td>
</tr>
<tr>
<td>KM plan</td>
<td>A plan setting out how knowledge will be managed within a project or programme.</td>
<td></td>
</tr>
<tr>
<td>KM strategy</td>
<td>A document, aligned fully to its commercial strategy, setting out how an organisation will implement KM and why.</td>
<td></td>
</tr>
<tr>
<td>Knowledge areas, subjects or topics</td>
<td>Knowledge categorised into discrete specialisms; often used interchangeably, these are the currency of KM.</td>
<td></td>
</tr>
<tr>
<td><strong>Key Words</strong></td>
<td><strong>Definition</strong></td>
<td></td>
</tr>
<tr>
<td>-------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Knowledge areas, subjects or topics</td>
<td>Knowledge categorised into discrete specialisms; often used interchangeably, these are the currency of KM.</td>
<td></td>
</tr>
<tr>
<td>Knowledge assets</td>
<td>A reference tool containing knowledge, information and images, created for the purpose of Knowledge Re-use.</td>
<td></td>
</tr>
<tr>
<td>Knowledge gap</td>
<td>An area, subject or topic of knowledge not available.</td>
<td></td>
</tr>
<tr>
<td>Knowledge harvesting interview</td>
<td>A structured one-to-one interview with an expert, used to identify Lessons or create a Knowledge Asset, as part of a Knowledge Transfer strategy.</td>
<td></td>
</tr>
<tr>
<td>Knowledge re-use</td>
<td>The application of knowledge previously created or captured. For many, this is ultimate aim of Knowledge Management.</td>
<td></td>
</tr>
<tr>
<td>Knowledge seeking</td>
<td>The act offending either experts or documented knowledge.</td>
<td></td>
</tr>
<tr>
<td>Knowledge transfer</td>
<td>Capturing tacit knowledge from staff and sharing it with others, both direct and via Knowledge Assets.</td>
<td></td>
</tr>
<tr>
<td>Learning after</td>
<td>Identifying lessons following an event, as well as recommending actions to embed such learning in future.</td>
<td></td>
</tr>
<tr>
<td>Learning before</td>
<td>Seeking lessons from previous similar projects, as well as consulting previous project team members during the planning phase.</td>
<td></td>
</tr>
<tr>
<td>Learning during</td>
<td>Identifying lessons during a project, as well as applying them before project closure.</td>
<td></td>
</tr>
<tr>
<td>Lessons capture</td>
<td>Capturing lessons from project teams, often during a facilitated meeting (See Retrospect for comparison).</td>
<td></td>
</tr>
<tr>
<td>Lessons identified</td>
<td>Learning points gathered from experience, including recommendations to embed such learning in future. (See Lessons learnt for comparison).</td>
<td></td>
</tr>
<tr>
<td>Lessons learnt</td>
<td>Recommendations that have been implemented in order to embed learning (See Lessons identified for comparison).</td>
<td></td>
</tr>
<tr>
<td>Mentor</td>
<td>An employee with experience to whom less knowledgeable colleagues are assigned as part of a Knowledge Transfer strategy.</td>
<td></td>
</tr>
<tr>
<td>Metadata</td>
<td>Data about data, such as: title, date of origin, date of entry, categories, owners etc.</td>
<td></td>
</tr>
<tr>
<td>Peer assist</td>
<td>An event at which historic project team members are consulted by a current project team to use their knowledge on one or several issues.</td>
<td></td>
</tr>
<tr>
<td>Pull</td>
<td>One of the 2 directions in which knowledge should flow, towards those that need it.</td>
<td></td>
</tr>
<tr>
<td>Push</td>
<td>One of the 2 directions in which knowledge should flow, from those that have it.</td>
<td></td>
</tr>
<tr>
<td>Retrospect</td>
<td>A series of facilitated meetings at which lessons are identified, often from projects or after a specific event (See Lessons Capture for comparison).</td>
<td></td>
</tr>
<tr>
<td>Return on investment (ROI)</td>
<td>An estimate of the value to be generated by spending money on a course of action.</td>
<td></td>
</tr>
<tr>
<td>Strategy</td>
<td>An organisation’s commercial strategy sets out a vision for the future and both a direction and method of travel.</td>
<td></td>
</tr>
<tr>
<td>Semantics</td>
<td>The study of meaning; when referring to a type of search capability, this indicates a degree of linguistic refinement, with returned results linked by context.</td>
<td></td>
</tr>
<tr>
<td>Taxonomy</td>
<td>A hierarchical classification of content, information and knowledge.</td>
<td></td>
</tr>
</tbody>
</table>
### Summary of appendices:

<table>
<thead>
<tr>
<th>Appendices</th>
<th>Key Words</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lesson template</td>
<td>This template enables project team members to capture all the learning points from an event, including background, what happened, root cause and recommended actions.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Referenced in Chapter: <a href="#">Learning from Projects</a>.</td>
</tr>
<tr>
<td>2</td>
<td>Project KM plan template</td>
<td>This template enables project managers to capture a project’s knowledge inputs and outputs, as well as assigning responsibility for the project’s various KM activities.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Referenced in Chapter: <a href="#">Learning from Projects</a>.</td>
</tr>
<tr>
<td>3</td>
<td>Community Launch and Development Checklist</td>
<td>Checklist to remind the different considerations and actions at different stages of the community lifecycle.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Referenced in Chapter: <a href="#">Enabling Collaboration</a>.</td>
</tr>
<tr>
<td>4</td>
<td>Knowledge Transfer Diagnosis Template</td>
<td>A template to list all the different areas of knowledge discussed above that can subsequently be used to prioritise a focus area.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Referenced in Chapter: <a href="#">Retaining Critical Knowledge</a>.</td>
</tr>
<tr>
<td>5</td>
<td>Knowledge Interview Session Plan and Approach</td>
<td>Guidance for running a knowledge interview session.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Referenced in Chapter: <a href="#">Retaining Critical Knowledge</a>.</td>
</tr>
<tr>
<td>6</td>
<td>What Could Be Important Knowledge?</td>
<td>Suggestions for reasons why a particular knowledge topic may be considered important and its possible impact on the business</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Referenced in Chapter: <a href="#">Retaining Critical Knowledge</a>.</td>
</tr>
<tr>
<td>7</td>
<td>Example Content for Knowledge Assets</td>
<td>Some example headings and descriptions for potential content in a product or process page of a knowledge asset.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Referenced in Chapter: <a href="#">Building Best Practice</a>.</td>
</tr>
<tr>
<td>8</td>
<td>Steps and Considerations For a Knowledge Cycle</td>
<td>Identifies some generic steps in a Knowledge Cycle (i.e. capture, share and re-use) and the detailed considerations.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Referenced in Chapter: <a href="#">Implementing KM</a>.</td>
</tr>
</tbody>
</table>
### APPENDIX 1 - Lesson template

<table>
<thead>
<tr>
<th>Lesson Title</th>
<th>Date of Occurrence</th>
<th>Author</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Learning Theme</th>
<th>Contact</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Lesson Priority | |
|-----------------|-
|                 |-

| Expected Event | |
|----------------|-
|                |-

| Actual Event | |
|--------------|-
|              |-

| Root Cause | |
|------------|-
|            |-

| Learning for others | |
|---------------------|-
|                     |-

| Action | |
|--------|-
|        |-

| Action by whom | |
|----------------|-
|                |-

| Action by when | |
|----------------|-
|                |-

| Date action complete | |
|----------------------|-
|                     |-


APPENDIX 2 – Project KM plan template

Context

<table>
<thead>
<tr>
<th>Project business objectives</th>
<th>Project knowledge objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>1.</td>
</tr>
<tr>
<td>2.</td>
<td>2.</td>
</tr>
<tr>
<td>3.</td>
<td>3.</td>
</tr>
</tbody>
</table>

Top critical knowledge areas for the project

**Inputs** – knowledge topics which the project needs to learn about in order to deliver the business objectives;

**Outputs** – knowledge topics which the project will gain knowledge about, to be shared with the organisation;

[To ensure a focus on Knowledge (Know-how) rather than Data of information, these topics should be expressed as “How to” statements. For example, “How to write a winning bid”, “How to market in Vietnam”, “How to commission a new software infrastructure”.

<table>
<thead>
<tr>
<th>Knowledge Inputs</th>
<th>Knowledge outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>How to ...</td>
<td>How to ...</td>
</tr>
<tr>
<td>How to ...</td>
<td>How to ...</td>
</tr>
<tr>
<td>How to ...</td>
<td>How to ...</td>
</tr>
<tr>
<td>How to ...</td>
<td>How to ...</td>
</tr>
<tr>
<td>How to ...</td>
<td>How to ...</td>
</tr>
<tr>
<td>Knowledge topic</td>
<td>Action needed to acquire the knowledge</td>
</tr>
<tr>
<td>-----------------</td>
<td>---------------------------------------</td>
</tr>
<tr>
<td>Knowledge input to the project</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Knowledge topic</th>
<th>Action needed to document the knowledge</th>
<th>Where it will be documented</th>
<th>By whom</th>
<th>By when</th>
<th>How to...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge output from the project</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Project learning protocol

<table>
<thead>
<tr>
<th>Action</th>
<th>Who is accountable?</th>
<th>When will they do it?</th>
<th>Where will they record it?</th>
<th>Activity is reviewed and lessons derived</th>
<th>Lessons are validated and actions assigned</th>
<th>Actions completed, documents updated</th>
<th>Completed actions are disseminated</th>
<th>Close-out of lessons is tracked and reported</th>
</tr>
</thead>
</table>

- **Employer skills programme - KM Toolkit**

- **Project learning protocol**

- **Action**

- **Who is accountable?**

- **When will they do it?**

- **Where will they record it?**

- Activity is reviewed and lessons derived

- Lessons are validated and actions assigned

- Actions completed, documents updated

- Completed actions are disseminated

- Close-out of lessons is tracked and reported
Implementation actions

<table>
<thead>
<tr>
<th>Action</th>
<th>By whom</th>
<th>When</th>
<th>Action status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assign project KM custodian</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Select project lessons database</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hold KM planning workshop</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Complete KM plan</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>KM plan signed off by management</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Train project team in KM processes and technology</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decide how KM plan will be reviewed and managed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assign contacts to key Communities of Practice (see below)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Key Community of Practice</th>
<th>Project contact</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX 3 - Community launch and development checklist

Interviews
- Sponsor & key players identified & invited to interviews
- Interviews conducted & analyzed

Concept draft
- Network concept drafted

Concept review
- Sponsor & key players invited to a review meeting
- Concept agreed
- Network charter & communication plan created

Communication
- Agenda for core group kick-off created & room organized
- Potential core group members & their managers involved
- Invitation to core group kick-off sent

Core group kick-off
- Core group meetings scheduled
- Core group meetings held

Action plan draft
- Draft concept & roles agreed
- Vision & roadmap created
- Core group meetings conducted

Core group meetings
- Agenda for next network meeting created
- Invitation to next network meeting sent

Network meetings
- Core group meetings conducted & analyzed

Feedback survey
- Network meeting facilitated

Interviews
- Feedback questionnaire created & sent to network members
- Feedback received & analyzed

Core group meetings
- Network members chosen & invited to interviews
- Network meetings conducted & analyzed

Action plan draft
- Action plan agreed
- Coordination of actions handed over to facilitator
- Core group meetings reviewed

Review of results
- Network concept reworked

Corrective action plan draft
- Corrective action plan drafted

Corrective action plan review
- Corrective action plan agreed

Corrective actions closed

Network launch agenda created & room organized
- Network launch facilitated

Network launch
- Network launch facilitated

Monitoring
- Uncompleted actions monitored & corrective actions taken

Implementation
- Corrective actions closed

Driven by initiator
Driven by core group / facilitator

Diagnosis
Planning
Start-up
Maturation
## APPENDIX 4 - Knowledge transfer

### Tasks and Activities

<table>
<thead>
<tr>
<th>Activity name and description</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recurring activities</td>
<td></td>
</tr>
<tr>
<td>Irregular activities</td>
<td></td>
</tr>
<tr>
<td>Open topics</td>
<td></td>
</tr>
<tr>
<td>(that will not be finished until handover)</td>
<td></td>
</tr>
</tbody>
</table>

### Projects

<table>
<thead>
<tr>
<th>Project name and description</th>
<th>Status</th>
<th>Next step</th>
<th>Due date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current projects</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Past projects</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Possible future projects</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Processes and ways of working

<table>
<thead>
<tr>
<th>Name</th>
<th>Comments and References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard and formal processes</td>
<td></td>
</tr>
<tr>
<td>Informal and implicit ways of working</td>
<td></td>
</tr>
</tbody>
</table>
## Technical and professional Knowledge

<table>
<thead>
<tr>
<th>Name</th>
<th>Comments and References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge area</td>
<td></td>
</tr>
</tbody>
</table>

## Contacts, interfaces, network

<table>
<thead>
<tr>
<th>Internal</th>
<th>Own department</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Other departments</td>
</tr>
<tr>
<td>External</td>
<td>Other companies</td>
</tr>
<tr>
<td></td>
<td>Universities</td>
</tr>
<tr>
<td></td>
<td>Networks and associations</td>
</tr>
<tr>
<td></td>
<td>Politics, authorities</td>
</tr>
</tbody>
</table>

## Management and Leadership

<table>
<thead>
<tr>
<th>Comments and References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task allocation</td>
</tr>
<tr>
<td>Resources</td>
</tr>
<tr>
<td>Budget allocation</td>
</tr>
<tr>
<td>Supplier Management</td>
</tr>
<tr>
<td>Leadership (people)</td>
</tr>
<tr>
<td>Quality</td>
</tr>
</tbody>
</table>

## Meetings and regular communication

<table>
<thead>
<tr>
<th>Meeting</th>
<th>Recurrence and location</th>
<th>Participants</th>
<th>Objectives and Content</th>
<th>Preparation</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Rules, routines and culture

<table>
<thead>
<tr>
<th>Comments and References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applied formal rules, standards and policies</td>
</tr>
<tr>
<td>Team or department culture and routines</td>
</tr>
<tr>
<td>Transnational culture and routines</td>
</tr>
</tbody>
</table>

### Background and history

<table>
<thead>
<tr>
<th>Topic</th>
<th>Comments and References</th>
</tr>
</thead>
</table>

### Documents

<table>
<thead>
<tr>
<th>Document name</th>
<th>Document type</th>
<th>Where?</th>
<th>What for?</th>
</tr>
</thead>
</table>

### Information gathering

<table>
<thead>
<tr>
<th>Information source</th>
<th>What for?</th>
<th>Access rights</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge area</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Software and tools

<table>
<thead>
<tr>
<th>Software or tool name</th>
<th>What for?</th>
<th>Access rights</th>
<th>Reference and Training</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge area</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Training and learning

<table>
<thead>
<tr>
<th>Name</th>
<th>Comment (content, benefit, mandatory, useful)</th>
</tr>
</thead>
</table>


APPENDIX 5 – Knowledge interview session plan and approach

1. Book a quiet room, away from any distractions and where disturbance is unlikely.
2. Prepare the key questions in advance that relate to the most important and critical knowledge topics. Send this to the interviewee so that they may have a chance to think about the answers or bring any supporting material.
3. Try to arrive before the interviewee, so that you have time to set up recording equipment (if used), notebook and pens etc.
4. On arrival, greet the interviewee, offer a glass of water and make some small talk to get to know one another.
5. Explain the purpose of the interview, covering once again who you are, why you are there, and what you will be doing. Reassure them that they will have editorial control over anything that's published. Reassure them that the bulk of the interview will be just like “having a chat” and that any audio or video recording is for transcription purposes; gain their written permission for recording to take place.
6. Start off the process by helping the interviewee identify particular successes or failures with which he or she has been involved. These tend to provide the most learning points and are good places to start. For each one mentioned, follow up by asking: “What were the key factors that made this a success?” or “What were the main things that disappointed you about the process?”
7. Assuming that you have identified some successes (or success factors) you need to start probing for the specific repeatable reasons for success. For example, you might ask:
   a. “One of the success factors you mentioned was “teamwork”. Can you tell me how this good teamwork was achieved?”
   b. “Why do you think your teamwork was so successful?”
   c. “If you were advising someone starting a similar project, what things would you advise them to do to ensure great teamwork?”
   d. “One of the major challenges you mentioned was the poor relationship the company had with its main supplier. Why do you think this relationship was so bad?”
   e. “What precisely went wrong, and why?”
   f. “If you were starting over tomorrow, what would you do differently to improve the relationship?”
8. As the interview progresses, you might find that new avenues of questioning develop. You can get into a questioning cycle, as follows:
   • Ask questions;
   • Explore the answers;
   • Summarise and feedback;
   • Develop new questions.
9. Don’t be satisfied with vague or ‘woolly’ answers – always try to press for specifics. You are looking, all the time, for recommendations that might prove helpful to the next person doing similar work. It is also worth spending time with the interviewee to identify their key reference documents, their key contacts and the structure of their working year.
10. End the interview by asking the interviewee to summarise the main lessons. The following question is one which we find very useful in prompting a good summary:
    “As a summary of what we have been discussing (and this will probably be repeating some of the things we’ve been through), if you were speaking to somebody who was just about to start on a similar project tomorrow, what would your key points of advice be?”
This section of the interview can be a good one to capture on video or audio file. You may want to give them a couple of minutes preparation time, or thinking time, before running the cameras.
APPENDIX 6 - What could be important knowledge?

The list below summarises some of the general reasons why a particular knowledge topic may be considered important and its possible impact on the business. Together with risk factors this can help identify the critical knowledge to be prioritised for KM activities.

**Mission critical today**
**Because of...** key role/occupation, important interface, recognised expertise, problem solving/troubleshooting.
**Impact on...** customer satisfaction, business continuity and the ability to deliver.

**Cross-boundary/Cross-functional**
**Because of...** transversal knowledge (function), business integrators.
**Impact on...** team-working, communication and efficiency.

**Future business strategy**
**Because of...** future business/markets, future technologies, innovation/intellectual property and research.
**Impact on...** long term sales profitability, market position and reputation.

**Supplier management**
**Because of...** need for intelligent customer role, important outsourced activities and commercial importance.
**Impact on...** supplier delivery and quality, contract/relationship mgmt, and negotiations.

**Safety/security**
**Because of...** directly affects safety, directly affects security, regulatory requirement, certification aspects..
**Impact on...** human health, company assets, ability to meet regulations, audit.

**Customer management**
**Because of...** maintain customer relationship, knowledge of markets, commercially important.
**Impact on...** customer relationship, sales/revenue and bidding/negotiations.

**Product**
**Because of...** comprehensive technical knowledge, design/decision rationale, historical knowledge and development.
**Impact on...** future product development and product quality.

**Process**
**Because of...** deep process knowledge, process rationale, historical knowledge and development, new way of working.
**Impact on...** future process improvement and efficiency/delivery.
APPENDIX 7 – Example content for knowledge assets

Below are some suggested headings and content for a typical “product” page within an informal knowledge asset e.g. wiki

1. **Description**: Provide a description of the System
2. **Functions**: List functions performed by the System.
3. **Airworthiness Regulations**: List associated Airworthiness Regulations
4. **Requirements**: Lists key requirements and constraints that are associated with the System
5. **Equipment**: List equipment that makes up the system with clickable diagrams/icons if available.
6. **Technical Interfaces**: Describes the technical interfaces associated with the system including Interaction diagrams.
7. **Related Activities**: List activities/tasks required to develop the System.
8. **Recommendations and Considerations**: Useful information and past experiences that impact the System including Lessons Learnt
9. **To Know More**: Contact details for people knowledgeable on the topic

Similar example for a “process” page

**Title**

<table>
<thead>
<tr>
<th>AIMS</th>
<th>INPUTS</th>
<th>OUTPUTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>•</td>
<td>•</td>
<td>•</td>
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</tbody>
</table>

SUCCESS CRITERIA

<table>
<thead>
<tr>
<th>PROCESS MAP</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>•</td>
<td>•</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>RELATED PAGES</th>
<th>USEFUL RESOURCES</th>
<th>USEFUL LINKS/EXAMPLES</th>
</tr>
</thead>
<tbody>
<tr>
<td>•</td>
<td>•</td>
<td>•</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>RECOMMENDATIONS AND CONSIDERATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>•</td>
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</tbody>
</table>
### APPENDIX 8 – Steps and considerations for a knowledge cycle

<table>
<thead>
<tr>
<th>Knowledge cycle step</th>
<th>Detailed questions</th>
</tr>
</thead>
</table>
| 1 Identify knowledge to be captured | • Is there a map of the knowledge owned by the area?  
• Is the critical knowledge identified?  
• Is there at least yearly planning to review the knowledge needs? |
| 2 Contribute (share new or evolved knowledge, lessons learnt, etc.) | • How is the knowledge currently captured and structured?  
• Standard elements for better description and share?  
• Re-use of engineering sources to limit re-work (links to related docs?)  
• How do you capture the evolution of the knowledge?  
• Who is checking the knowledge is updated? |
| 3 Validate and extract knowledge from application experience | • Who validates the knowledge?  
• How do you check the knowledge is correct?  
• How do you make sure the knowledge is updated?  
• What is the role of experts in the knowledge cycle? |
| 4 Capture user needs and feedback | • How do you capture users’ needs?  
• How do you capture user feedback?  
• How do you ensure that users have the right access to the right knowledge at the right time? |
| 5 Reuse knowledge: Codify knowledge and provide the what, why and how to | • How do you make sure the knowledge is reusable? (easy to access, to understand, contain all needed info, links to docs, etc.)  
• Is there a structure of the content (taxonomy), to make it easily accessible and adapted to user needs? Is the context described?  
• How do you standardise ‘How-To’ for ensuring correct application of the knowledge? |
| 6 Use (right info to the right person at the right time) | • How do you make sure the knowledge is disseminated and reused? Is the reuse embedded in existing processes as mandatory step?  
• How do you make sure the right knowledge is used by the right person?  
• How do you make sure each employee can access the right knowledge at the right time? How do you manage access rights?  
• Is there a protection for sensitive knowledge? (rationale not available by default to ensure IP protection – manage the access for the extended enterprise) |
| 7 Manage performance, evolution and deviation from standards | • Do you allow deviation to standard? How you control it?  
• How you make sure the knowledge is reused, meaning the right knowledge is captured?  
• Do you have a feedback loop in place? |
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