Measuring How Well Knowledge is Managed in Organisations

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Abstract: When the question of measuring the effectiveness of Knowledge Management is addressed it is most often in the context of discrete initiatives. These initiatives invariably focus on a specific aspect of Knowledge Management, such as the creation of Knowledge Directories, capturing knowledge from older soon-to-retire employees. Measuring effectiveness then becomes a matter of recording and analysing the extent to which employees participate in these initiatives, how much output is produced, and the impact of the initiative on revenue compared with the initiative's costs to calculate a Return On Investment.
While these initiatives are laudable and valuable in their own right they are essentially ad-hoc or supplementary to an organisation's mainstream activities. This paper puts forward the view that managing knowledge is integral to all an organisation's core activities and how effectively it is carried out directly affects overall organisational performance.
To measure Knowledge Management effectiveness, however, it is first necessary to decide what needs to be measured. To do this a framework is developed that draws on two seminal concepts in management theory: Michael E Porter's 'Value Chain' (1985), and Douglas C Engelbart's 'CoDIAK' concept (Concurrent Development Integration and Application of Knowledge)(1995). The framework has three dimensions – Knowledge Scope, Knowledge Dynamic, and Knowledge Resources. These dimensions are used to put forward measures of effectiveness that can be applied on an ongoing basis by organisations to assess and monitor how well knowledge is being managed.
Finally, to explore their practical application, the measures developed using the framework are applied to two organisations as case studies to evaluate how well they manage their knowledge.
Keywords: Knowledge Management, Value Chain, CoDIAK, KM Measurement, KM Framework, Case Study, Knowledge Scope, Knowledge Dynamic, Knowledge Resource, Knowledge Taxonomy

1. Introduction

When organisations undertake programs to improve their Knowledge Management, they typically find themselves implementing one or more discrete initiatives, such as:

- Schemes for identifying employees' skills, expertise, and experience and cataloguing them in a way that facilitates better connections and collaboration - so called Knowledge Directories (APQC 2015).
- Programmes to capture knowledge from older, more-experienced employees (held tacitly) and make it available in explicit form (an example is Shariff 2015)
- Programmes to encourage employees to share personal information online (via a network connection or Intranet), and developing effective search capabilities for locating documents and other knowledge resources. This includes such things as corporate 'Pinterest' sites for sharing bookmarks (an example is Berzins 2015).
- Develop taxonomies for classifying content held on a Network or Intranet to make it easier to browse or search for information via metadata, and to encourage employees to develop and document knowledge covering particular areas (so-called 'Knowledge Maps').
- Creation of 'communities of interest' amongst employees, in which they actively discuss issues and problems and share knowledge.

These are all worthwhile and important initiatives for organisations but when measuring their effectiveness there tend to be two typical limitations:

- The focus tends to be on whether the initial implementation is successful, rather than its ongoing use within the organisation.
- All the initiatives tend to be viewed as ad-hoc in terms of their relationship to the organisation as a whole, complete with individual Return on Investment (ROI) calculations (Cohen 2006). That is, they tend to be seen as beneficial to the organisation in a supplementary way rather than integral to its operation.

What seems to be missing is a framework in which all Knowledge Management initiatives are seen as fundamental to the inner workings of the organisation, and are seen as working together in a complementary

way to achieve overall improvements in effectiveness. This framework would then provide the parameters with which an overall and ongoing approach to measuring Knowledge Management effectiveness can be developed. In light of this, the objectives of this paper are to establish principles on which such a framework may be based, to develop the framework itself, and to explore how it may be applied in practice to measure Knowledge Management effectiveness.

2. Constructing a Knowledge Management Framework to Measure Effectiveness

To begin construction of a Knowledge Management framework we can draw conceptual inspiration from two highly regarded thinkers operating in very different areas. These areas have been implicit in most Knowledge Management discussions and initiatives but are rarely made explicit and therefore are rarely explored fully in terms of importance and impact.

The first area is that of the technology that supports widespread and dynamic interactions around knowledge resources – computers, networks and web browsers, the internet, and software for file management, document sharing, online collaboration, and so on. In most discussions on Knowledge Management the latter are simply taken as given or treated as tools available to assist with initiatives rather than regarding them as integral to Knowledge Management itself and amenable to being shaped by the best Knowledge Management practices.

A key thinker in this area is Doug Engelbart. As part of his work on the use of computers to augment the human intellect he put forward a concept for Knowledge Management that he encapsulated in the acronym CoDIAK (Engelbart 1995). This stands for Concurrent Development, Integration, and Application of Knowledge. The idea behind this is that the most effective systems for managing knowledge (that is those that bring the most creative effort to bear on solving problems) are those that support the development of knowledge, its integration into the problem-space that it applies to, and its application in that space, all at the same time.

This means that in a Knowledge Management Framework, the measures of effectiveness used should look at the extent to which CoDIAK exists. Engelbart's researches focussed on how computer and telecommunications technology could be best developed to support CoDIAK activity.

The second area is that of organisational theory and Michael E Porter's Value Chain concept (1985). When considering what knowledge is important to an organisation, it makes sense to start with the activities that comprise its Value Chain. These are the activities that connect with each other in order to create the value that the organisation delivers in its products and services. The better these activities are performed, the greater the value. And by extension, the better knowledge is developed and applied within these activities; the better they will be performed.

This means that when trying to measure how effectively Knowledge Management is being carried out, the framework used must consider how well Knowledge Management addresses the unique value-adding activities of that organisation and the way that they inter-relate.

Typically, organisations reporting on their Knowledge Management efforts decided on the areas of the organisation that should be the subject of Knowledge Management initiatives by reference to 'strategic priorities' or they implicitly assumed that Knowledge Management initiatives should be applied preferentially to front-line, technical areas (Cohen 2006).

Also, when considering the tangible elements of Knowledge Management – that is the documents and files containing the knowledge – these are often referred to simply as 'content', with no clear distinctions as to their type or nature, to be classified according to taxonomies developed by reference to user preferences (Zack 1999). What the Value Chain concept suggests, however, is that Knowledge Management is potentially equally relevant to all value-adding and supporting activities in the organisation, and if the organisation is to focus consistently on its value-adding activities, knowledge should be organised around those activities (and any sub-units into which they can be logically divided) – so taxonomies should reflect this. If this conflicts with user preferences then it means that employees have a different mental picture of the how the organisation works than the strategic reality. A key implication of this is that implementing an accurate taxonomy may actually help to bring about better employee alignment and focus.

3. Applying the Value Chain Concept to Knowledge Management

Applying the Value Chain concept to knowledge management can be achieved by taking the principles inherent in the approach and using them to identify the specific areas of expertise relevant to an organisation. Those principles are:

- All organisations are focussed on creating value (adding value to inputs at the margin).
- All organisational activities should be viewed as contributors to creating value.

- All organisational activities can be divided into 'primary' functions and 'support' functions.
- Primary functions are areas of specialisation that form a 'chain' of activities that convert inputs into outputs, adding value as each function is performed.
- Support functions are areas of specialisation that provide essential services internal to the organisation that allow primary functions to be performed in an optimal way.

These principles can be applied to any organisation to draw a Value Chain picture that is specific to that organisation. Primary and support areas of activity are defined by the degree to which they are specialised in nature and therefore subject to specific expertise /knowledge. The use of the Value Chain concept to delineate areas of organisational activity is gaining greater and greater currency (Aghina et al 2015). By using these principles to frame a taxonomical scheme for knowledge resources, the organisation automatically ensures alignment with its strategic direction.

If the organisation changes its direction at any time it must re-define its Value Chain and by extension the expertise /knowledge required to implement it. In other words, when an organisation changes its operations, its knowledge must change with it and this approach ensures that that happens.

Every organisation needs to identify its own Value Chain in terms of the general principles noted above but for the purposes of discussion Figure 1 shows a value chain adapted for application to knowledge management that identifies high level functions and their relationships.

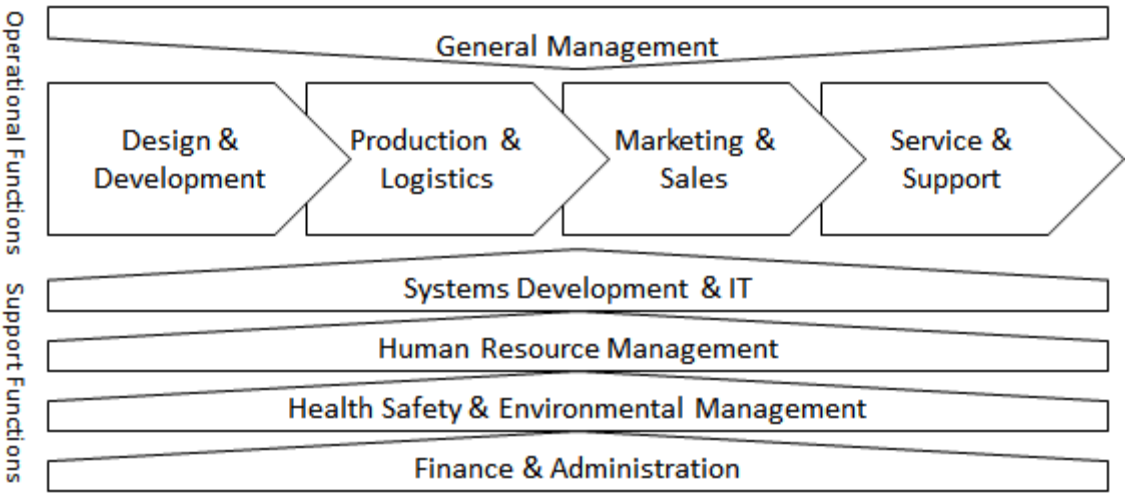

Figure 1 KM adapted Value Chain

Note that in Figure 1 the support function labelled 'General Management' occupies a special position in the diagram. There is insufficient space to elaborate on this in this paper but the intention is to define an area of activity that controls and directs all other operational and support activity. This singles it out as a 'special case' support function when considering an appropriate structure for capturing and utilising enterprise knowledge. The view put forward is that this function constitutes the 'kernel' of the enterprise and determines what other functions are required and the general rules by which they will operate.

4. A Function and Process-Based Classification of Knowledge

This KM adapted Value Chain identifies nine high-level categories into which knowledge resources can be grouped (Table 1):

Table 1 High-Level Knowledge Categories From Value Chain

General Management
Design & Development
Production & Logistics
Marketing & Sales
Service & Support
Systems Development & IT
Human Resource Management
Health Safety & Environmental Management

It is evident that this list may be similar to the divisional structure of many organisations (or aspects of it). This is not surprising given that the key criterion for defining these functions is specialisation in terms of value-adding expertise /knowledge, which is also a factor in the determination of decision-making authority and resource management responsibility. But the two should not be conflated, if only to maintain a purely objective standpoint when assessing the organisation's true Value Chain.

In essence, the Value Chain describes a process. It can be viewed as a high-level 'process map' of the organisation. And given that it is high-level, the categories identified should be able to be sub-divided using the same principles. That is by posing the question, "what value-adding activities (aka processes) are applied in each specialised area in order to achieve that area's aims?"

This is an assessment that each organisation needs to make for itself but by way of example Table 2 lists a possible two level vocabulary for a taxonomical scheme for knowledge based on a Value Chain view of the organisation.

Since we have already identified that the Value Chain view of an organisation is effectively a 'process map', this is a good opportunity to settle on some meaningful terms to identify the vocabulary items in the taxonomical scheme derived from it. Accordingly, I will refer to the high-level categories as 'Functions' and their subdivisions as 'Processes'.

Table 2 Knowledge Taxonomy - Functions and Processes

FUNCTION	PROCESS
General Management	Governance and risk management Planning and reporting
Design & Development	Research and analysis Design development Production integration and handover
Production & Logistics	Managing supplier relationships Controlling production Storing and distributing products
Marketing & Sales	Managing customer relationships Planning and implementing marketing programmes Processing sales
Service & Support	Providing technical advice and support Maintenance and servicing
Systems Development & IT	Developing and maintaining IT infrastructure Software applications development User help and support
Human Resource Management	Managing work environment and behaviour Recruitment and induction Employee development Employee administration
Health Safety & Environmental Management	Managing health safety and environmental systems Dealing with accidents and incidents

Listing the organisation's processes based on its Value Chain provides a clear and comprehensive set of categories for classifying knowledge. If these categories are carefully and accurately assessed they will identify all of the organisation's key areas of specialised expertise /knowledge that contribute to the value it creates as a whole.

From the point of view of measuring Knowledge Management effectiveness, the extent to which Knowledge Management initiatives cover these categories will be the extent to which Knowledge Management is applied to the organisation as a whole. If Knowledge Management initiatives only address a few of the above-listed categories, or simply a mixture of various aspects of them, then no matter how sophisticated they are, they will only be partially effective for the organisation as a whole.

In addition, the fact that these categories are process-based means that:

- Knowledge Management initiatives and programmes are automatically aligned with process improvement programmes, and can therefore be integrated with them

- Process outputs and efficiency (resource use) are routinely measured as a part of process improvement activity. This means that the effectiveness of Knowledge Management aspects of the process will automatically be measured insofar as they are inputs to the overall process's effectiveness.
- Employee teams tend to focus on processes so grouping knowledge resources on that basis makes it easier for teams to access the available knowledge.

5. Introducing CoDIAK into the Framework

Orientating Knowledge Management around processes in this way also supports Engelbart's concept of CoDIAK (Concurrent Development Integration and Application of Knowledge). This is achieved by making Knowledge Management disciplines and technologies an integral part of both process improvement and process implementation.

Process improvement is about increasing process knowledge and applying it to enhance quality and efficiency. Measurement, analysis, discussion, problem-solving, and collaboration for process improvement are all assisted by having good knowledge resources available for the process.

When new ideas and changes are tested and implemented, the Knowledge Resources associated with the process should be updated accordingly. This greatly assists successful implementation of changes, ongoing efficient operation, and future improvement. Too often knowledge resources are overlooked in the haste to bring about change because they are not seen as an integral to the process. Unfortunately the result of this is that often process change takes place inefficiently or fails altogether.

For Engelbart, CoDIAK was a guiding principle for the development of technologies that help people to work together more effectively when attempting to solve large complex problems. Engelbart was instrumental in setting the foundations for the development of Networks, Graphical User Interfaces, and Hypertext.

When considering Knowledge Management practices in organisations, it is all but impossible to separate them from the operation of networks, web browsers, intranets, the internet, and software for content management, file management, document sharing, and online communication and collaboration. This means that any measures of effectiveness must take into account how well an organisation chooses, deploys, and develops its ICT resources to support Knowledge Management.

6. Deconstructing 'Content'

Our Knowledge Management Framework now has two key components:

- A system for identifying and classifying the knowledge required to successfully manage and develop the enterprise (a Value Chain /Process-based Knowledge Taxonomy)
- A concept for dynamically developing and applying knowledge consistent with that system (CoDIAK), which is also integral to process improvement activity and to the development and application of facilitating technology.

What remains to complete the framework is a clearer and more specific view about what constitutes 'Knowledge' in the organisation.

When considering this, the first issue to address is that of 'Explicit' versus 'Tacit' knowledge. The latter is the knowledge that employees have in their heads, and which is the subject of many Knowledge Management initiatives aimed at connecting people and facilitating cross-consultation. I would like to leave Tacit Knowledge out of the equation for the moment and focus purely on Explicit Knowledge. The reason for this is that there is an argument to be made for the view that Tacit Knowledge is part of the CoDIAK dynamic and, as such, should automatically feed into the generation of Explicit Knowledge, at the same time as being nourished by it. This is supported by the tacit-to-explicit-to-tacit dynamic articulated by Nonaka and Takeuchi (1995).

Explicit Knowledge refers to the tangible things being managed when we talk about Knowledge Management (Zack 1999). These things have been referred to already as Knowledge Resources and they include mostly text documents, but increasingly sound and video recordings as well, which are created, stored, and accessed predominantly as digital electronic files.

These types of files exist in abundance in organisations. The problem often faced however, is how to measure how effective these files are as stores of knowledge and how well managed they are for this purpose. To do this we first need to get a clearer picture of what these files cover in terms of information content. This is not a straightforward task, as evidenced by the fact that many Knowledge Management practitioners avoid the issue entirely by simply referring to these files as 'Content', this being the generic term for files (including html pages) accessed via an Intranet or Network.

We can begin to break down 'Knowledge Resources' or 'Content' by first making a distinction between 'Reference Files' and 'Records'. The term 'Reference Files' refers to all those files that provide guidance, instructions, insights, or understanding of particular circumstances, activities, or requirements. The term 'Records', on the hand, refers to files that only contain facts about transactions. These may relate to individual transactions, or they may be summaries and analyses of facts from multiple transactions (statistics).
From a Knowledge Management point of view, 'Reference Files' should be our principal or primary focus because these are the files sought by employees when they need a better understanding of how things work, what to do or decide in certain circumstances, or how to perform a particular task. These are all things where the accuracy, insight, depth, experience, and authority of the information make a big difference to performance.
'Reference Files' can be divided further into those that relate directly to an organisational process and those that have more general application. Typically, 'Process Reference Files' include policies, procedures, work instructions, process diagrams, and so on – in fact, any file of information that directly provides insights or guidance into the effective implementation of organisational processes. 'Other Reference Files' are those that similarly provide useful information that is accurate, insightful, in-depth, experience-based, and authoritative, but is more general in nature and more likely to be sourced externally to the organisation.
Error! Reference source not found. Figure 2 illustrates the components of Knowledge Resources included in the Framework and their relationship to 'Content'.

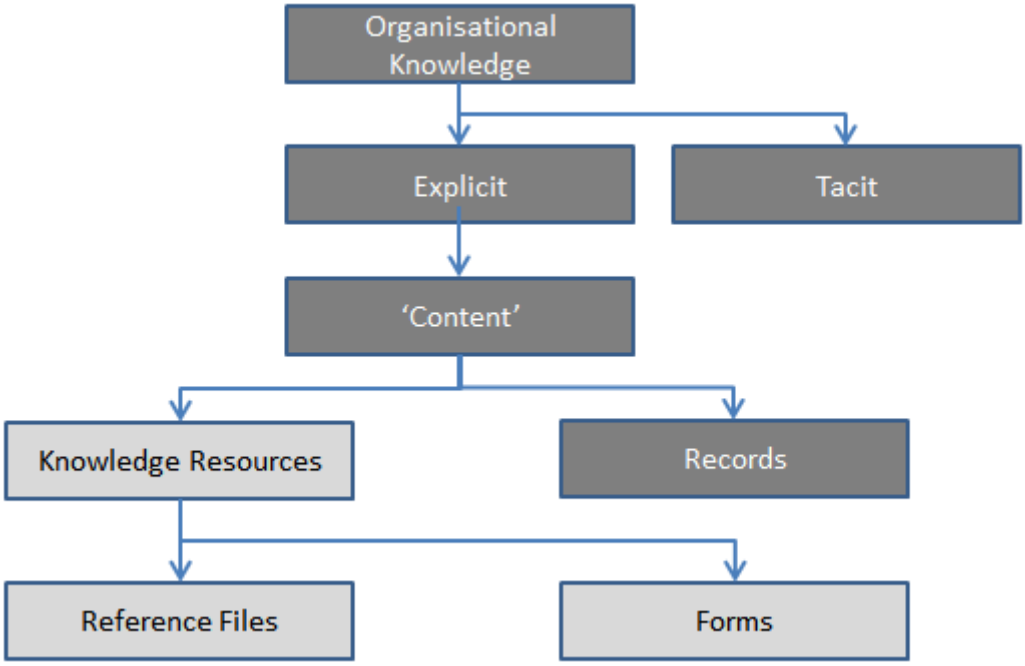

Figure 2 Components of Organisational Knowledge

Forms are included with Knowledge Resources based on a number of criteria. Unfortunately there is insufficient space in this paper to elaborate on these, suffice it to say that they are ubiquitous in organisations and they capture and convey both implicit and explicit knowledge.

7. Effective Knowledge Resources

Having identified more clearly what sorts of files constitute Knowledge Resources, the obvious question to ask is what determines how effective these files are as vehicles for transferring knowledge.
This question raises a host of issues around measuring the quality and usability of the information contained in files, as well as their presentation, relationship to other files, and metadata employed to support classification and search-ability. Rather than go into the complexities here in this paper, I simply offer a list of factors that logically bear on how effective Knowledge Resource files will be. Knowledge resources are more effective when they:

- Contain information that is relevant, user orientated and readable (that is, the information is pertinent to the user's situation and provides useful insights or aids that assist the user to solve the problem faced, and which can be readily understood by the intended user).

- Contain information that is accurate, current, and authoritative.
- Are presented in file formats and IT contexts that are selected and structured to support immediate utilisation, search-ability, and connectivity in terms of providing direct links to related files /information (in practice this will be reflected in a combination of modular information packaging, IT file-handling capabilities, and metadata).

8. A Knowledge Management Framework for Measuring Effectiveness

The Knowledge Management Framework now has three dimensions:

- Knowledge Scope: A system for identifying and classifying (scoping) the knowledge required to successfully manage and develop the enterprise (a Value Chain /Process-based Knowledge Taxonomy)
- Knowledge Dynamic: A concept for dynamically developing and applying knowledge consistent with that system (CoDIAK) that also encompasses the technologies used and integrates with process improvement.
- Knowledge Resources: A specification for the types of components (Knowledge Resources) that make up the stock of files in which organisational knowledge is stored and disseminated, and a specification for the characteristics of those files and their contents that determine their quality.

This framework allows us to identify measures of Knowledge Management effectiveness. It covers those things that seem logically intrinsic to the management of organisational knowledge, namely what areas of knowledge are pertinent (Knowledge Scope), what is actually being managed when we practice Knowledge Management (Knowledge Resources), and what the key drivers of new and revised knowledge and their results are (Knowledge Dynamic). Table 3 sets out suggested measures for each of these.

Table 3 Measures of Knowledge Management Effectiveness

Knowledge Scope	Knowledge Dynamic	Knowledge Resources
Qualitative measures		
▪ The extent to which there is a clear methodology in place for identifying the areas of expertise /knowledge that are required by the organisation. ▪ If there is a methodology in place, the extent to which its results align with a Value Chain /Process-Based Taxonomy (VC/P-BT) approach.	▪ The extent to which CoDIAK is supported by positive employee incentives and cultural reinforcement. ▪ The extent to which CoDIAK is connected with the generation and enhancement of Knowledge Resources and the processes employed to support and encourage innovation and process improvement. ▪ The extent to which CoDIAK is supported by networking, hardware, software, and telecommunications capabilities.	▪ The extent to which there are processes in place to ensure that Knowledge Resources are accurate. ▪ The quality of the information in Knowledge Resource files in terms of user orientation and readability. ▪ The quality of Knowledge Resource files in terms search-ability and connectivity (modularity and metadata).
Quantitative measures		
▪ The extent to which the Taxonomy's vocabulary /classifications covers all required areas of operational and support expertise (Gap Analysis /% Coverage).	▪ The frequency with which Knowledge Resources are utilised to support organisational activity (aka 'Application'). ▪ The frequency with which Knowledge Resources are updated, expanded, and improved (aka 'Development and Integration').	▪ The extent to which there are Knowledge Resources in place for all identified required areas of expertise (Gap Analysis / % Coverage) ▪ The extent to which Knowledge Resource files are current and authoritative (% to total).

9. Applying the Framework – Case Studies Exploring Measurement Issues

These case studies were prepared on the basis of data from two companies collected during 2014 and 2015. These data were only able to be taken from what was already available within the organisations at the time. It is hoped that this early analysis will pave the way for a future more detailed longitudinal research study. Background to the two companies is as follows:

Company 1: A medium-sized privately-owned construction group, with operations covering general-purpose commercial buildings (offices, warehouses), special-purpose buildings (hospitals, research institutions, and laboratories), commercial interiors, and remedial construction. The company began a project to develop its systems for managing knowledge resources in 2009, which was completed in 2011. It has continued to be develop its systems since then. Over the period from 2009 to 2015 the company increased its revenue from $100M to $400M.

Company 2: A large contracting group focussing on infrastructure construction, maintenance and operation, as well as contract mining. It began a major project to integrate and better control its knowledge resource in 2008 and had substantially implemented it by 2010 after overcoming a number setbacks and false starts from an ICT perspective. From 2010 to the time the below data were collected the company increased annual revenue from $5.3B to $7.9B.

Each company is evaluated in terms of the measures listed in Table 3 with some comparative comments.

Company information

Item	Company 1	Company 2
Period of data collection	7 Months to Nov 2015, Annualised	Calendar Year 2014
Average No of employees	250	9900

Knowledge Scope

Measures	Company 1	Company 2
Methodology in place for identifying the areas of expertise /knowledge required.	System scoped on the basis of a group-wide perspective categorising content primarily by Function & Process, but also by Business Unit (Construction, Fit-out, etc.).	System scoped on a group-wide basis using multiple classification schemes – business unit, process, product type, resource type – with no primary focus.
Align with a Value Chain /Process-Based Taxonomy.	Function & Process classifications modelled using a Value Chain analysis.	Process classifications 'laundry listed' based on consensus assessment. No explicit 'Value Chain' approach.
Taxonomy's vocabulary covers all required areas of operational and support expertise (Gap Analysis /% Coverage).	**98%**. Proportion of organisational activity covered by classification categories. Some high level corporate processes were not included.	**73%** Proportion of organisational activity covered by classification categories. Classification categories contained gaps, overlaps, and duplications in terms of organisational activity.

Comparing the two companies, the Value Chain approach resulted in a higher level of coverage of organisational activity. It is likely also that the use of the Value Chain approach to provide the primary means of classification also resulted in a better ability to browse and locate knowledge resources as reflected in the measured frequency of use (see Knowledge Dynamic comments below).

Knowledge Dynamic

Measure	Company 1	Company 2
CoDIAK is supported by positive employee incentives and cultural reinforcement.	Integrated with new employee induction and training but otherwise not explicitly reinforced for application (usage)	Development phase was supported by accountable working groups, but not explicitly reinforced on an ongoing basis.

	or development and integration (content development)	
CoDIAK is connected with the generation and enhancement of Knowledge Resources and innovation and process improvement.	General recognition that knowledge resources are all handled within a consistent system. Compliance management for quality, health & safety, and environmental management is integrated. No explicit integrated innovation and improvement activity. Integration relies heavily on central facilitators.	Despite efforts to encourage active management of knowledge resources, only one area set up an effective community of practice to continuously develop and improve its content within the system. All other areas relied heavily on central facilitators to integrate new knowledge.
CoDIAK is supported by networking, hardware, software, and telecommunications capabilities.	Implemented using SharePoint and widely available in-house and off-site. Quick and easy access to knowledge resources via browse and search. No capacity to provide direct online feedback or engage in online discussion and real-time content development.	Custom application developed using the Oracle UCM (Universal Content Management) application. Widely available online both in-house and off-site but a complex user interface limits browsing capabilities. Users tend to rely on search functions. Online feedback capability provided but no capacity to engage in online discussion and real-time content development.
Frequency with which Knowledge Resources are utilised to support organisational activity.	**82%** Proportion of employees accessed knowledge resources during the data collection period. 170 per year Average number of resources accessed by users. 65% Proportion of all knowledge resources accessed at least once during the period. This means that 35% of knowledge resources were not accessed at all during the period.	**50%** Proportion of employees accessed knowledge resources during the data collection period. 360 per year Average number of resources accessed by users.
Frequency with which Knowledge Resources are updated, expanded, and improved.	391 /25% Number of knowledge resources edited during the period / As a percentage of total resources.	1551 /10% Number of knowledge resources edited during the period / As a percentage of total resources.

Company 1 achieved a much higher level of engagement by employees in terms of application (82%) than Company 2 (50%) principally as a result of explicit integration with new employee induction and training. Overall for both companies, the 'development' and 'integration' aspects of CoDIAK appear to have significant potential for improvement from both cultural and ICT perspectives. The major weakness here appears to be heavy reliance on a relatively small centralised group of facilitators.

Knowledge Resources

Measure	Company 1	Company 2
Processes in place to ensure that Knowledge Resources are accurate.	The system has workflow support for continuous draft-approval-publish-redraft cycles but lacks formal enforcement	As for company 1.

	/reinforcement of content accountability.	
Quality in terms of user orientation and readability.	Takes a 'topic' based approach derived from DITA principles employed in technical communication.	Presents information in a variety of in-house developed 'units', which includes a web 'landing page' that collects links to related resources.
Quality in terms search-ability and connectivity.	'Topic' based approach supports a high level of search-ability. Knowledge resources are modular and concise and metadata use is consistent.	Complexity of knowledge resource 'units' tends to make search results harder to interpret. There are shortcomings in modularity and metadata consistency.
Knowledge Resources for all areas of expertise (Gap Analysis / % Coverage)	**98%** Given the maturity of system, coverage is the same as Knowledge Scope.	**73%** As for company 1.
Files are current and authoritative (% to total).	No objective measurements in place but estimated at around 75-80% given limitations on Knowledge Dynamic capabilities.	As for company 1.

The quantity of knowledge resources was high for both companies and quality in terms of currency and authority much the same. However, Company 1's knowledge resources had higher usability and search-ability due to their simpler modular structure and consistent use of metadata.

10. Conclusion

The aim of this paper was to offer a framework for assessing and measuring how well organisations manage their knowledge and to begin to explore how it might be applied by evaluating two organisations against it. While the case studies were limited in scope they point the way to future possible longitudinal studies to measure the development of knowledge management over time and correlate these with measures of organisational performance.

By including the concepts of Knowledge Scope, Knowledge Dynamic, and Knowledge Resources in the framework in the way defined in this paper, it is argued that knowledge management will be handled such that it is integral to the organisation and in a way that supports both its own sustainability and the sustainability of the organisation as a whole.

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