

■ Case Study

Defining a Process for Developing Responsive Knowledge Pathways

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To identify how organizations approach the development and implementation of their core processes in a manner that focuses on continued flexibility and responsiveness to changing customer needs, and environmental impact factors through improved knowledge transfer.

The research follows an empirically based multiple case study approach across six national/multi-national knowledge-based organizations. A core-complex process was identified within IBM and then tested and refined across five over national/multinational organizations. Within each organization key employees interviewed concerning the manner in which their core processes were managed and modified.

Those organizations that identified their core business processes as being responsive, and flexible enough to meet changing customer expectations could be shown to follow a 'nine-step' process lifecycle. However, those that had less-responsive processes seemed to share similar organizational and managerial issues.

The findings are based on a limited sample size of six organizations, and the nature of the findings are presented in an inductive-theory building way. Therefore, the findings are not presented as a final position, but as a starting point for further research into complex, knowledge transfer intensive business process development and design.

From the findings a nine-stage process lifecycle model has been defined.

Within any service-orientated organization core business processes are under pressure to manage continually changing customer requirements. Therefore, it is important not just to build efficient and effective processes, but to understand how the organization must be aligned in order ensure continued performance within a constantly changing operating environment. Copyright © 2010 John Wiley & Sons, Ltd.

INTRODUCTION

In today's complex organizations the need to develop and control knowledge-dependant business critical processes is vital to the overall success of the business (Skyrme and Amidon, 1997; Teece, 1998). However, the traditional functional approach, through a silo'ed view of process development is failing to deliver responsive, efficient and effective processes needed to support inter and intra-organizational business collaboration (Argote and Ingram, 2000; Van Weele, 2002). The problem is further compounded by the rate of change now being experienced by organizations, where processes are constantly under pressure to support changing business direction and objectives. Therefore, an important question is how can

organizations, dependant on responsive complex business processes, ensure the processes remain so in such a dynamic environment (Troyer, 1995; Lee *et al.*, 1997). Many organizations are successful in changing their processes, but what mechanisms do they employ to ensure these processes, once deployed, do not 'drift' away from their core function; a problem the author believes is inherent in many traditionally aligned organization. This is a view supported by Maull *et al.* (1995) and Smart *et al.* (1999) who identify the need for a commonly accepted and used reference model in order to 'manage, operate and support' enterprise wide business processes.

This paper will look at how six separate organizations manage their core process development and lifecycles. Although the organizations are very different in the services and products they offer, all are complex in nature and are trying to deliver their offerings in a dynamic, changing business environment. This paper will identify the main aspects of process control that the more

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successful organizations use, and from this propose a framework for developing knowledge-dependant complex processes for complex organizations.

The research presented in this paper is part of a larger, on-going initiative to understand how service organizations can better utilize 'knowledge-dependant' processes in a manner that directly impacts end-to-end complex process performance. As part of the investigation into knowledge transfer activities across six large complex knowledge-intensive organizations, the author has identified a common approach used by those organizations whose core processes continue to be viewed internally as responsive and flexible to changing customer needs.

BACKGROUND

The rate at which organizations have to manage change is increasing. Coupled to this fact organizations are also becoming aware of the need to focus on customers needs and desires in the development and provision of their products and service (Moller *et al.*, 2008), as a failure to do so will almost certainly result in the loss of business to competition (Kulp *et al.*, 2003). This increasing rate of change and need to understand, and even predict, customer behaviour means an organization's processes for product/service development and delivery need to be increasingly flexible and responsive (Koste and Malhotra, 2000; Koudal and Wellener, 2003). Unfortunately, many organizations now operate increasingly complex processes that may be caused by any number of reasons such as increasing organizational size, operating in a vertically dis-integrated alignment or simply a failure to discard redundant processes (Goerzen, 2005; Osborne and Brown, 2005; McLaughlin *et al.*, 2006; Kestilä *et al.*, 2007). However, identifying the reasons is not the purpose of this paper. What is important is that organizations need to understand how to ensure their core business processes can be developed so they become more resilient to the constant need for change (Maull *et al.*, 1995; Smart *et al.*, 1999), and support the flow of business critical knowledge transfer (Skyrme and Amidon, 1997; Teece, 1998; Smolnik *et al.*, 2005; McLaughlin, 2009). Within a service-orientated environment this becomes particularly vital as the need to understand and be able to respond to constantly changing customer requirements becomes a determining factor to an organizations continued ability to successfully compete (Bell, 1999; Tidd and Hull, 2003; Karmarkar, 2004). As Abernathy (1978) identified as a key premise for the innovation model (Abernathy, 1978) the rate of product-innovation exceeds that of process-innovation during the early stages of a product's life. Over time processes stabilize, however, the constant rate of change now experienced by most

organizations can see process's quickly falling behind the rate of product development, thus leading to a situation where process performance becomes a weak-link in an organizations ability to remain competitive. (Lu and Botha, 2006).

Through the research presented in this paper the author has endeavoured to identify, across six service-orientated organizations, those aspects of their process management, that makes, or prevents, their core business processes from supporting the needs of the business.

Through initial research, conducted within IBM's EMEA Integrated Supply Chain organization (to be referred to in figures and tables as Organization 1), the author has identified eight steps for developing responsive, knowledge-dependant process pathways.

Initial framework for responsive process pathways

The author observed and interviewed employees across the IBM organization responsible for developing and maintaining a core supply chain process. The supply chain process was designed to ensure the expedient fulfilment of customer orders for customized and in some cases personalized hardware product. From the observations and data gathered a basic framework was defined (Figure 1).

The effective development and implementation of responsive core business processes, for IBM (Organization 1), is dependent on following certain tasks in a prescribed order. These tasks, or stages, are outlined in Figure 1 and stages are linked in a manner that helps Organization 1 drive process changes that will improve knowledge and information access, creation and sharing along the entire process. The left hand side of Figure 1 outlines the key stages in developing, implementing and maintaining knowledge-dependant processes within a complex organization. The stages are generic in that they can be applied to any complex organization. The process flow starts with the 'Define Process' stage. This sees the formation of a cross-functional process team, the selection of a core process and the agreed core process boundaries, where it starts and where it ends. The use of cross-functional teams at this stage is seen as fundamental in ensuring operational efficiency (Xu *et al.*, 2009). The implementation process then moves on to identify and work through the key elements that must be identified and managed; process structure, process ownership, key performance indicators, organizational structure around core process and knowledge barriers. Once these tasks have been addressed, the process focuses on the identification and prioritization of process improvement changes. This leads into the final stage that is the 'Monitor Impact on Performance' stage. Due to the way changes to a complex process can have 'up' and

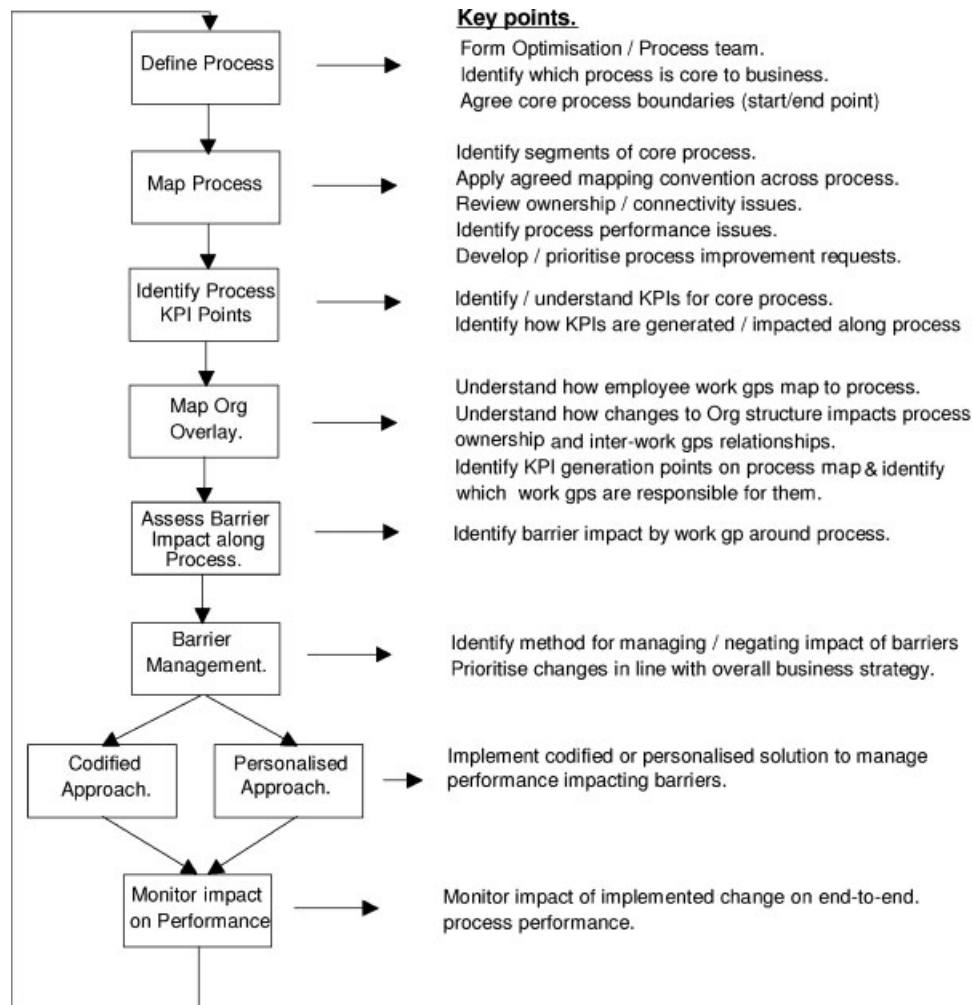


Figure 1 Initial framework for developing knowledge-dependant processes

'down' stream effects on overall performance, the process needs to be monitored to ensure any changes do not introduce instability across the core process, which in turn can adversely impact overall performance. This process stage leads back into the 'Define Process' stage, and from there the cycle repeats itself again.

The time spent within each stage of the framework for managing knowledge-dependant processes will vary. The first time the process is implemented within an organization, it is expected significant time will be spent on the first five stages of the process. However, once the cross-functional process team are fully engaged, the process mapped, the knowledge barriers identified and the different work groups identified and mapped to the core process, more time can be spent identifying performance improvement changes. The first five stages will still need to be revisited on a regular basis as changes to the overall business strategy, external business relationships, technology improvements, cultural and business environmental issues can and will impact core process structure, barrier impact and possible key performance indicators.

This framework ensures that the creation of knowledge-dependant, core business processes are

developed as a dynamic on-going business exercise. The ability of the framework to generate responsive processes is dependant on the need to manage performance impacting knowledge barriers (Barson *et al.*, 2000; McLaughlin and Paton, 2008). As the type and impact of barriers will change along the core process the methods used to manage their impact will shift between codified or personalized in nature (McLaughlin, 2009). It is because of this that no single implementation approach can be used to manage knowledge and information flows across the organization.

However, if the framework were to have any relevance it would need to be assessed against other organizations operating complex knowledge-dependant processes. This paper will outline how the process of comparison was managed and the subsequent findings that in turn served to refine the initial framework model.

METHODOLOGY

The research follows an inductive-theory building approach, using empirical data collected through a multi-case study method. In order to understand

the mechanisms and conceived perceptions concerning process development and deployment within the selected organizations it was necessary to conduct some form of interview or structured questionnaire. Considering the complexity of the potential answers, and the need from a research perspective to clearly understand the subtle differences that may exist, the author opted for an audit approach. There are many different types of audit currently in use (financial, computer, forensic, *etc.*). However, the author decided to follow the clinical audit process (NHS, 2002). This decision was due to the fact that medical audits focus on data collection for the purpose of process analysis, process improvement and implementation (Jones and Cawthorn, 2002). Through the audit process the author could also ensure the quality of input from the participating organizations by providing a case study report outlining areas of concern and recommendations for process improvement, in effect providing a level of free consultancy.

Defining the audit process

The selected audit process followed the clinical audit process as defined by Jones and Cawthorn (2002) and Swage (2000). The key steps within the audit cycle are outlined as follows:

- (1) Identify problem.
- (2) Set criteria and standards.
- (3) Observe practice/data collection.
- (4) Compare performance with criteria and standards.
- (5) Implement change.

Looking at these steps in relation to the research requirements the case study audit was designed and developed as shown in Table 1.

It should be noted that as the author is not an employee of any of the organizations selected for

audit and therefore step 5 (implement change) was not within the control of the author. Therefore, the author could only make recommendations based on the findings presented through analysis during steps 3 and 4.

Criteria for selecting participating organizations for multiple-case study

The initial test case (IBM—Organization 1) was unique in many ways. The global nature of its business, product/service portfolio, culture and structure meant it would not be possible to find identical organizations against which to test the initial framework. Therefore, some means of selection would need to be used to ensure as close a fit as possible against certain criteria that in turn would support the testing of the initial findings from IBM. The criteria used by the author to help select suitable organizations for inclusion in the research are listed in Table 2.

It is against these five criteria that organizations were assessed for suitability of inclusion in this study. Table 3 assesses six organizations, including the initial test case; Organization 1, against the criteria listed.

Gathering the data

As the author was not familiar with the different participating organization's processes a suitable assessment mechanism was needed to ensure those processes selected for audit where relevant to the framework. Therefore, each organization was asked to identify a suitable business process based on the following criteria:

- (1) Process for selection must be complex in that it spans two or more business functions across the organization.

Table 1 Case study fit with audit criteria (modified from Jones and Cawthorn, 2002)

No	Key audit steps	Case study audit process
1	Identify problem	The 'problem' in this case is looking at how complex organizations develop and manage their core processes from a knowledge transfer perspective
2	Set criteria and standards	Audit to look at organizations that fit with selection criteria, have an identified single point of contact is nominated, and have identified a common core process—which spans the more than one business function across the organization
3	Observe practice/data collection	Conduct data collection through audit questionnaire, and then refine by presenting findings to respective organizations for final review/clarification/approval
4	Compare performance with criteria and standards	Compare final data analysis with proposed theory and five tenets for implementing knowledge strategy along complex processes
5	Implement change	Provide a case study report to each organization that includes recommendations in line with proposed theory on implementing knowledge strategy along complex processes

Table 2 Criteria for case study selection

Criteria	Description
Business relationship	Organizations that need to co-operate with third party vendors or business partners in order to fulfil customer needs. In this case the organization in question owns the customer relationship from initial contact to final order delivery and post sales support. It is this operating characteristic that defines, for the purpose of this research, the organization as complex
Processes	Complex organizations are those whose core business processes are managed not by one internal business function, but by input from different business functions (both internal and external to the organization)
Process alignment	Complex organizations recognize the need to align their organizations along key business processes. Thus effectively moving from a functional alignment to a process alignment
Customer focused	Complex organizations need to provide flexibility in development and provision of customized/personalized customer products. Thus introducing an additional level of complexity driven by a need to be able to capture/create information and knowledge in new ways
Type of control structure	Complex organizations that have a distributed, as opposed to centralized organizational structure. Although it is not vital that a selected organization's structure is distributed, organizations with less peer-to-peer contact will, it is expected, experience more barriers

- (2) Those individuals asked to complete the questionnaire can be either management or non-management. However, they must have practical experience of working with the process.
- (3) Those individuals asked to complete the questionnaire must be from different parts of the organization.

Analysing the data

The analysis of the audit questionnaires and feedback followed a structured approach as the emphasis is on ensuring validity, reliability and generalizability of findings (Gibbs, 2005). The approach can further be broken down to pattern matching (validity checking) with the focus being

to try and establish causal links between the circumstances investigated (focus on knowledge habits when developing core processes), and a predicted outcome (refinement of a framework concerning process development in complex organizations from a knowledge transfer perspective). If the pattern of circumstances and outcomes coincide with that predicted, then strong support is given to the validity of the findings (Yin, 2003; Gibbs, 2005).

For the purpose of this part of the research, a type of pattern matching called 'explanation building' was used. This procedure is sometimes referred to as 'analytical induction' because it builds up support for an explanation in an inductive way (Yin, 2003; Gibbs, 2005). In effect, the objective of the explanation building analysis is not to conclude a study but to develop ideas for further study (Yin,

Table 3 Assessment criteria for complex organizations

	Organization 1	Organization 2	Organization 3	Organization 4	Organization 5	Organization 6
Business	Technology/ Services	Healthcare	Engineering/ manufacturing	Finance	Logistics	Electronics/ manufacturing
Type	Multi-national	National	Multi-national	Multi-national	Multi-national	Multi-national
Business relationship	Complex	Complex	Complex	Complex	Complex	Complex
Complex processes	Yes	Yes	Yes	Yes	Yes	Yes
Process alignment	Functional moving to process	Functional moving to process	Functional moving to process	Functional moving to process	Functional moving to process	Functional
Customer focus	Yes	Yes	Yes	Yes	Yes	Yes
Type of control structure	Distributed	Distributed	Distributed	Distributed	Distributed	Centralized

2003). This is important to keep in mind, as the case studies provided are not extensive studies relating to the respective organizations. However, what they are intended to do is identify best practice that may or may not correspond with the theory developed by the author, thus allowing the external validation of the initial research and further refinement of the researcher's theory on improving knowledge transfer along complex processes.

CASE STUDIES

All six participating organizations varied significantly in terms of size, offering and reach. However, all six were trying to develop and offer complex products and services via complex business processes. An overview of the six organizations will give further insight into the more common and unique aspects of their respective natures.

Case study: Organization 1 (technology services)

Organization 1 is a global provider of technology services with a presence in over 120 countries and over 300 000 employees. This company divides its operations up into four key areas: North America, Latin America, Europe, the Middle East and Africa (EMEA) and Asia Pacific. The organization identified a core supply chain process for review. The process controlled the provision of hardware products to multiple channels (B2B and B2C) throughout EMEA. The process involved coordinating customer orders through the organizations fulfilment group and out to outsourced manufacturing, distribution, back to in-house installation and billing. These are all aspects of the supply chain process that are managed from different locations, and in some cases different countries. This process needs to be able to capture and respond to the unique and constantly changing requirements of the organization's customers. Many of who are global organizations in their own right, and who come from all industry sectors.

Case study: Organization 2 (health services)

Organization 2 is responsible for improving the health of more than 553 000 people living within a region of the UK. Primary health care is provided in the community and includes general practitioners (GPs), psychiatrists, dentists, pharmacists, health visitors and a wide range of health professionals. Organization 2's primary care facilities include health centres and 17 community and day hospitals, and employs approximately 12 000 staff. Organization 2 identified the Single Shared Assessment

(SSA) process. This process spans primary care and social services and looks to assess patient needs from a support and ongoing care management perspective. The process involves coordination of community nurse care, social services, general practitioner and psychiatric services. Input for this case study was received from community nurse care, social services, primary care management and clinicians for psychiatric services.

Case study: Organization 3 (engineering/manufacturing)

Organization 3 is one of the largest defence contractors in Europe, and is firmly placed in the top 10 defence contractors worldwide. The company has a presence on five continents and employs approximately 90 000 people. Although primarily a defence contractor, this organization is also a significant player in the manufacture of commercial aircraft. The company turns over approximately £15 billion in sales annually; with a research and development spend of £1.2 billion. The process identified within Organization 3 was the Life Cycle Management process. This process looked at how the lifecycle on large capital projects could be managed in both a cost effective and responsive manner over significant periods of time (5–20 years). Once a project had been completed, commissioned and handed over to the end customer, Organization 3 would assume all aspects of management of the projects lifecycle from initial build, on-going maintenance and modification, through to final decommissioning. This was a complex process that required many aspects of the organization to work closely in collaboration in order to ensure high availability of their products and services to their end customers.

Case study: Organization 4 (finance)

Organization 4 is globally recognized bank and a member of an international financial services group which at September 05 had assets of more than £180 billion, almost 8 million banking customers and more than 2.3 million wealth management clients. The bank is a socially inclusive bank, with a range of financial services solutions tailored to the needs of all income levels. As well as personal and commercial banking the group also provides a comprehensive range of insurance and investment options. From this the organization identified for audit is the Integrated Financial Solutions (IFS) process. The process controls how new and existing financial offerings are integrated and managed through the banks portfolio management system. The process in effect serves to link both front and back office systems for the bank. A key performance criterion for this service is its ability to respond

to changes in customer borrowing and saving practices, and also changes in the competition's product offerings.

Case study: Organization 5 (global logistics)

Organization 5 is a European group with an international network of 22 800 employees in 120 countries. Ranking among the top 5 European logistics companies, it is recognized for its capacity to control all or part of the supply chain: distribution, logistics, full and part loads, air and sea transport commission and reverse logistics. In addition, the organization also provides a worldwide network for air and deep sea forwarding. The complex process identified was the S&U returns process. This process identified the steps taken to ensure the proper inspection, receipt, storing and issuing of customer field returns of finished products. The areas involved with this process are manufacturing, distribution, warehousing and quality.

Case study: Organization 6 (electronics/manufacturing)

Organization 6 is an international leader in electromagnetic compatibility (EMC), focusing on high-growth sectors such as automotive, industrial electronics, consumer goods and telecommunications. The organization develops, produces and markets standard and customer-specific components, modules, test systems and test facilities. The organization is headquartered in Switzerland. The complex process identified was the process for introducing new products within the global sales and distribution networks. The process was complex in that it required interaction and input from marketing, sales, R&D, procurement, planning, production, distribution and quality.

CROSS CASE ANALYSIS

Although the type of organizations selected for inclusion in the audit varied in form and function quite significantly, the research focused on process development from a knowledge enablement perspective. Once viewed from this perspective, key aspects of process development could be identified for comparison across the respective organizations. Table 4 highlights and contrasts the similarities and differences in approach that the participating organizations have to process development and management, with respect to effective knowledge transfer.

In particular, the case study comparison is looking to highlight variations in how organizations approach

process development (identify best practice), and how organizations with responsive processes develop their information/knowledge strategies.

Looking across the case study comparisons (Table 4) some interesting patterns emerge.

Knowledge understanding

All respondents were able to distinguish the difference between tacit and explicit knowledge. However, although some placed different importance of one over the other, this was mainly driven by existing information and knowledge requirements facing the organization at that time.

Knowledge strategy

This provided an interesting insight into how organizations, understanding what knowledge is, try to tackle the complex problems associated with 'managing' knowledge. The dominant approach across the different organizations is a codified one. However, what is important is how the organization decides on the strategy in the first place. What the case study reports identified was that those organizations with a generally perceived 'responsive' process had knowledge strategies that were developed based on an understanding of barrier issues, or more specifically how employees work with information and knowledge. The emergent strategy was then customized to support the knowledge transfer needs of different parts of the organization. Those organizations with less responsive processes had no clearly defined knowledge strategy, or at least no strategy that was linked to how employees access, create and share information/knowledge across the organization. In these cases the strategy usually involved an organization wide codified systems deployment that is focused on information storage and transfer; in effect the strategy is mainly focused on explicit to explicit transfer.

Main factors impacting knowledge transfer

As expected, different organizations will experience different key barriers. Two interesting findings concerning barrier impact came out from the case studies. The first was that barriers were seen to manifest in different ways at different points along the process. These findings supporting the initial research indicate that barriers will impact differently along core processes. The second was that even though the dominant strategy across the groups was codified one of the main key barriers identified was the availability of technology to support knowledge and information creation and transfer. When the respective organizations were questioned about this further, this barrier related to how individuals assess, create and share

Table 4 *Comparison of key aspects of case studies*

	Organization 1	Organization 2	Organization 3	Organization 4	Organization 5	Organization 6
Process view	Good E2E understanding of process objective	Good E2E understanding of process objective	Good E2E understanding of process objective	Good E2E understanding of process objective	Good E2E understanding of process objective	Good E2E understanding of process objective
Knowledge understanding	Place higher value on explicit knowledge than on tacit knowledge	Place higher value on tacit knowledge than on explicit knowledge	Main focus is on explicit capture/access. However, tacit knowledge seen as important for innovation	Place higher value on tacit knowledge than on explicit knowledge	Knowledge is a human attribute. Success dependent on harnessing tacit knowledge	Good understanding of the difference between tacit and explicit
Knowledge strategy	Mainly codified	Heavily dependant on codified systems. Personalized to define requirements, and codified to capture and disseminate requirements	Combined codified and personalized—emphasis on codified. However, looking to develop tacit knowledge approach	Evolving into a codified approach. No clear strategy defined	Combined personalized and codified	Evolving into a codified approach. No clear strategy defined
Main factors impacting knowledge transfer	Arduous relationships, available technology, causal ambiguity, trust	Organizational structure (silos), available technology, causal ambiguity, knowledge is power.	Available technology, causal ambiguity, Arduous relationships	Communications, available technology, motivation, organizational structure	Top-down communications	Causal ambiguity, organizational structure
Do barriers differ across org?	Yes	Communications Yes	Yes	Yes	Yes	Yes
Process development	Centrally developed and updated and managed	Centrally developed, locally managed and updated	Centrally developed and updated. Locally managed	Centrally developed, locally managed and updated	Centrally developed and updated. Locally managed	Centrally developed, locally managed and updated
End user involved in initial process development?	Yes	No	Yes	No	Yes	Yes (very limited)
Process control	Functional	Functional	Functional	Functional	Functional	Functional
Managing barrier through process development	Use personalized approach to identify barriers and solutions. This drives process development requirements	People and org barriers not directly considered. Technology barriers considered from an availability perspective	Belief that org wide ICT will remove most barriers	Deployed org wide codified systems, and rely on informal personalized networks to resolve barriers as and when they arise. No focus on explicit/tacit crossover points	Use personalized approach to identify barriers and solutions. This drives process development requirements	Belief that codified systems will support personalized knowledge transfer. No focus on explicit/tacit crossover points
Considering employee knowledge transfer practices	Process developed by/with employee input. Thus ensuring how employees use info/knowledge is embedded in process solution	Not really considered at process development stage. Main focus on data capture/transfer. Leave personalized aspect to evolve naturally	Process developed by/with employee input. Thus ensuring how employees use info/knowledge is embedded in process solution	Process developed from top-down perspective. Risk and legal requirements main drivers	Process developed by/with employee input. Thus ensuring how employees use info/knowledge is embedded in process solution	How employees use info/knowledge not considered during process development

Key drivers for process development	E2E Process connectivity, available technology, access control	Focus is on E2E process development, connectivity and control. Lowest priority given to data storage and retrieval, and access control	Process control, E2E connectivity	Available technology, how employees share explicit information, process E2E connectivity	E2E Process connectivity, available technology, access control	Process control, process access
E2E process connectivity	Initial development focuses on E2E connectivity. Central team for impact assessment reviews changes	Initial development focuses on E2E connectivity. However, once deployed no tracking of local modifications	Process implemented on a project-by-project basis. Project teams responsible for E2E operation and connectivity. Central development team assesses any change requests	Initial development focuses on E2E connectivity. However, once deployed no tracking of local modifications	Initial development focuses on E2E connectivity. Central team for impact assessment reviews changes	Initial development focuses on E2E connectivity. However, once deployed no tracking of local modifications
Prioritizing change	Centrally managed. Impact assessed by process team	Locally managed. Changes prioritized based on funding available	Changes are assessed at a project level and assessed in accordance with overall impact on project. Changes can then be passed to central team to assess for possible permanent change to process	Cost—v-benefit. Changes happen at local level not always linked to overall strategy (quick wins)	Customer impact. All change requests are reviewed centrally with all interested parties present	Customer impact. Locally managed. Everything tends to be top priority
Is process responsive?	Responsive	Not responsive. Process seen as less response than previous process	Responsive. This is a vast improvement on previously employed process	Sometimes responsive. Major improvement on previous system	Responsive	Sometimes responsive
How is employee buy-in managed?	Process developed by practitioners. Encourage sense of ownership and responsibility	Not proactively sought during process development stage. Dependent on training and communications post deployment	Process developed by practitioners. Encourage sense of ownership and responsibility	Through individual performance appraisal and reward scheme	Process developed by practitioners. Encourage sense of ownership and responsibility	Not proactively sought during process development stage

information relative to their own individual/group practices and the apparent failure of organizational-wide codified systems to support this. In effect this also relates to how many codified systems focus on data storage and transfer (explicit to explicit) but fail to support the many different tacit to explicit and explicit to tacit transfer practices along the core process.

Process development

This gave a very clear picture as to how the participating organizations go about the business of process development and management. All organizations developed their core processes centrally. However, those organizations with responsive processes maintained future developmental control once the process had been deployed. The central development teams also maintained an active part in the control and ongoing modification of the process post deployment. Those organizations with less responsive processes, although centrally developed, passed operational and developmental control over to the respective business units responsible for the day-to-day operational management of the process. Post deployment changes could then be made locally without any central review. This resulted in there being no definitive process descriptor available, and no clear understanding of end-to-end impact of local changes, or assurance local changes complied with overall strategic business direction.

Another important aspect of the development is how employee knowledge and information sharing practices are considered during process development. Those with responsive processes all rely on end user involvement in the initial stages of the process development.

End user involvement

This was a key differentiator between the participating organizations. Those with responsive processes actively sought employee involvement with on-going and future process development. Those organizations that used end-user expertise in their process development did so in the knowledge that this would facilitate the identification of barriers that in turn would impact the process once deployed. By taking this bottom-up development approach the organization wanted to achieve two things. Firstly the development of a more responsive process that was in-tune with the end user's information and knowledge creation and sharing habits, and secondly, the development of a sense of ownership and 'buy-in' from employees for the process.

Process control

There is a belief that in order to support a supply chain operation, the organization must look to re-align from a functional to process alignment (Van Weele, 2002). The evidence from the case studies would not necessarily support this view. The participating organizations all operationally managed their processes from a functional alignment perspective. However, all recognized the importance of end-to-end process connectivity. Therefore, whilst the organization continues to operate in a functional alignment, the important point is that the core process is developed, and controlled, and owned centrally by a process-aligned team; thus ensuring that the process does not become fragmented and locally modified without cognisance of the overall end-to-end impact. If organizations adopt this approach it may reduce the overall importance to re-align the overall organization.

Managing barriers through process development

This provided an initial view into how the respective organizations started to develop their knowledge strategies. The organizations with responsive processes used teams to set out design parameters for core process development. Thus, initially a personalized approach was used to identify knowledge/information barriers. From this the team would then recommend the best approach to managing the barriers; be it codified, personalized or a combination of both. In essence, the aim of the knowledge strategy was to provide a combination of approaches dependent on, and matched to the different parts of the process, and relative to barrier impact. This approach to successful knowledge strategy implementation also supports the initial research finding that knowledge strategy needs to be aligned to process knowledge/information needs, and not deployed as part of a blanket organization-wide solution.

End-to-end connectivity

All organizations believed this to be a priority in process development and management. However, only those organizations with a responsive process maintained an active control over process development throughout the processes lifecycle. This allowed the 'responsive process' organizations to better gauge the impact of potential changes across the entire end-to-end process.

Those organizations with less responsive processes developed their processes from a top-down perspective, with little or no end-user involvement, and once the process was deployed tended to pass operational and development responsibility over to

Table 5 Identified stages in knowledge-dependant process development

Implementation steps	Organization 1	Organization 2	Organization 3	Organization 4	Organization 5	Organization 6
Is process responsive?	Yes	No	Yes	Sometimes	Yes	Sometimes
Centrally define process E2E	Yes	Yes	Yes	Yes	Yes	Yes
Centrally map process E2E	Yes	Partial	Yes	Partial	Yes	Partial
Identify process KPIs	Yes	Yes	Yes	Yes	Yes	Yes
Centrally identify process improvements (bottom-up)	Yes	No	Yes	No	Yes	No
Map organization overlay.	Hierarchical and networked	Hierarchical only	Hierarchical and networked	Hierarchical only	Hierarchical and networked	Hierarchical only
(Who works where along the process)	Yes	No	Yes	Limited (only those relating to technology)	Yes	Limited (only those relating to technology)
Assess knowledge transfer barrier impact	Yes	No	Yes	Limited (only those relating to technology)	Yes	Limited (only those relating to technology)
Pro-actively manage barriers	Yes	No	Yes	Sometimes	Yes	Sometimes
Select suitable knowledge approach (codified/personalized)	Yes	Yes	Yes	Yes	Yes	Yes
Monitor performance impact	Yes	No	Yes	Sometimes	Yes	Sometimes
Continually review process (close loop)	Yes	No	Yes	Yes	Yes	Yes

the respective business units. Once this happened operational owners would modify the process to take into consideration local working practices. These changes would not necessarily be reviewed centrally and therefore, their up and down stream impact on the process would not be known.

Prioritizing change

The success organizations experienced in ensuring process change requests are prioritized in line with business objectives, and with limited negative impact was linked to the way processes were locally controlled. Prioritization of change happened best where all process owners were involved. This way, up and down stream impact could be assessed and a decision to accept or reject the change request would be made on the basis of overall benefit to the process, and business objectives. Those organizations that maintained local control of process development and change tended to have the less responsive processes.

Ensuring employee buy-in

Once the process was deployed, getting employees to use and accept it would be a main consideration in the speed at which the process is integrated into mainstream business operations. Once again, the participating businesses approached this differently. Those with less responsive processes depended on achieving buy-in once the process was deployed. A number of techniques are used ranging from on-the job training to individual appraisals and reward schemes. Those organizations with responsive processes simply relied on employee buy-in being established through generating a feeling of ownership for a process they helped design and deploy. Although, these organizations also provided training (as not every employee could be involved in the development) the use of regular communications from the employee development team to the wider user community was felt to build confidence in the process, which in turn accelerated the acceptance of the process by the wider user community. Failure to communicate process changes from the top down was also seen as a contributing factor in preventing an expeditious acceptance of new processes in those organizations with less responsive processes.

This analysis helped to further understand how the case organizations approached the way in which they manage and process development. Table 5 shows how the respective case organizations conformed, and non-conformed with the initial framework as outlined in Figure 1. From Table 5 a comparison can be made between those organizations that perceive their processes to be responsive, and those stages of the framework that they see as being inherent in their respective process lifecycle

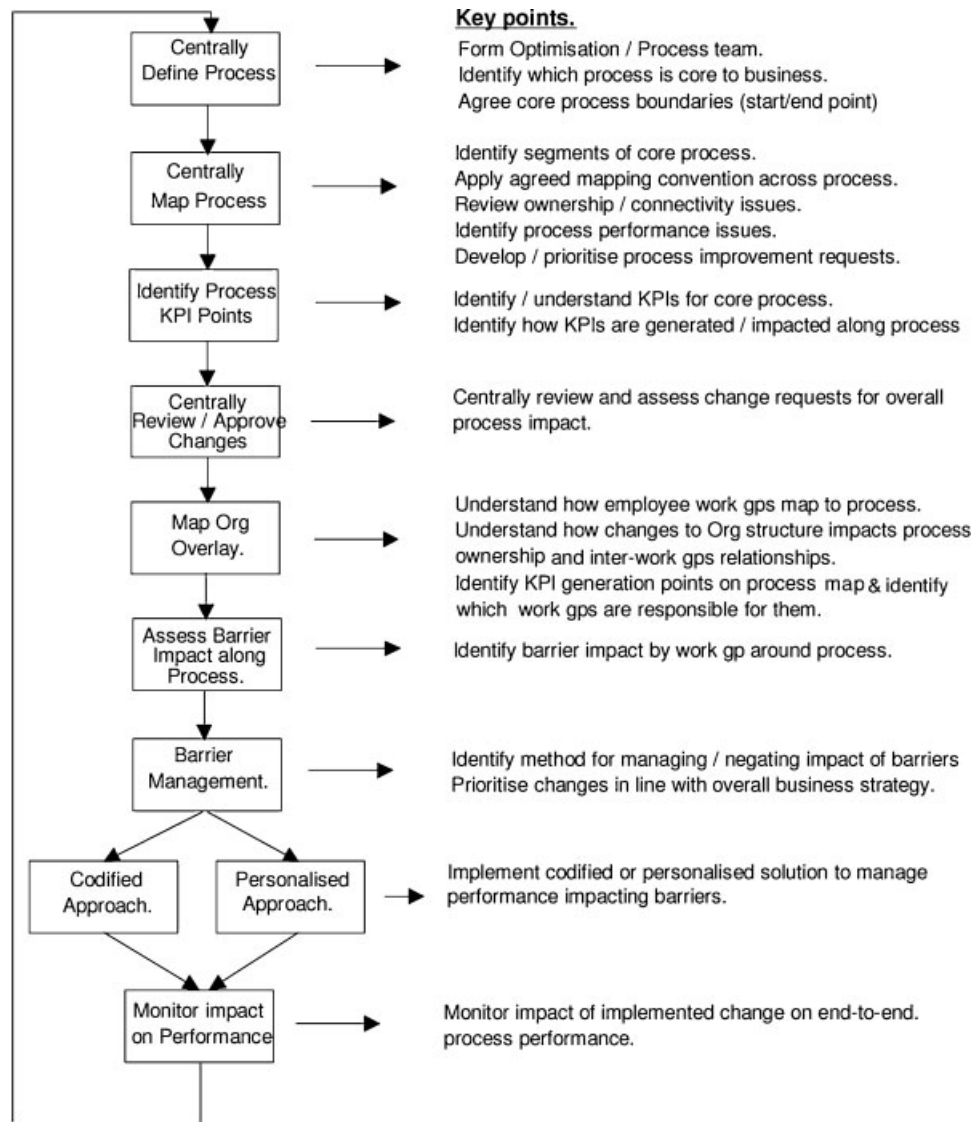


Figure 2 Framework for developing knowledge-dependant processes (amended)

management. Figure 2 shows the modified framework based on the findings as outlined in Table 5.

CONCLUSION

The original framework for developing knowledge-dependant processes (Figure 1) was reviewed in line with the findings outlined in the case study reports. Table 5 shows how the implementation model mapped to the different case study organizations, and the degree to which they do, or do not comply with the model (bold text indicated compliance with the knowledge strategy implementation model).

When the importance of bottom-up, end-user involvement is taken into consideration, the original implementation strategy process (Figure 1) changes. The first two steps are amended from 'define' and 'identify' to 'centrally define' and 'centrally identify', respectively. This emphasizes the important role the centralized team play in the overall development of the core process (McLaughlin *et al.*, 2006). An additional step is introduced after the

'identify process KPIs' step. The new step (in bold in Table 5) highlights the importance of ensuring process improvements are handled centrally; thus ensuring up and down stream impact assessments are made before any changes are implemented.

Another important finding from the initial test case (Organization 1) and subsequent case study research is the existence of different knowledge transfer barriers along the core process pathways. Although, as expected, the barriers differ in appearance and impact depending on the organization, what is interesting is how the different organizations identified and managed the barriers. Evidence suggests that those organizations with the more responsive processes identify and manage barriers centrally from a bottom-up perspective. This allows for the identified barriers to be considered during the development of their core processes. Those organizations with less responsive processes tend to develop processes from a top-down perspective with little consideration given to barrier impact until post deployment. Thus barrier issues are left to local management to resolve

locally. This has, and does result in sub-optimal process operation. This finding therefore, supports the research finding that core processes are best managed and developed centrally, with change request prioritization being handled by a centralized, process aligned cross-functional team.

Although the case study research was not extensive, the initial findings would point to the fact that many large organizations do not consciously develop knowledge strategy, but rather allow one to emerge. This emergent strategy is influenced by existing information and data requirements and as such usually develops into a codified approach. Those organizations that adopt a centrally driven, bottom-up approach to process development tend to use a personalized (team driven) approach to help identify specific knowledge barrier issues along the process and agree on a suitable approach to resolve them. Therefore, in these organizations the knowledge strategy develops from a bottom-up perspective based on knowledge and information practices along core process pathways. This approach also allow the process team to identify barriers which surround the knowledge transfer cross-over points post process deployment. These are the points along the process where codified and personalized knowledge transfer happen, and provide the largest potential for knowledge loss along the core process. As such their effective management provides the most potential benefit in optimizing the overall process. Those organizations which do not consider where these knowledge transfer cross-over points exist along their core processes leave the effective transfer of knowledge at these points to chance. Therefore, for an organization to rely on an organization-wide, top down, knowledge strategy it could result in a failure to properly manage knowledge barriers, which in turn will result in a process that will fail to reach its operational performance potential.

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