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# The post-Nonaka Knowledge Management

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**Abstract:** The objective of this paper is to describe a new post-Nonaka generation of Knowledge Management that, for the first time, has the potential to meet people's expectations. It is divided into the three categories:

- processes
- organisation & culture
- information technology

and builds on Frederik Taylor's idea of applying knowledge to work, though not on his Scientific Management model. Instead, it extends to Knowledge Workers and gives answers to the key question of Knowledge Management: How can the productivity of knowledge workers be increased?

**Keywords:** Third Generation Knowledge Management, Productivity, Knowledge Worker, Scientific Management, SECI, ASHEN, Cynefin, On Demand Workplace, Knowledge Management Optimization Factors, KM Factors
**Categories:** A, H

## 1 Introduction

Knowledge Management is a fairly young management discipline, but many people believe that it has already reached its zenith. This paper will explain that this belief is based on the detours knowledge management has made in its first two generations, building on paper based knowledge strategies and the make believe that knowledge can be documented to a large extent.

Section 2 will describe the last 10 years history of Knowledge Management and will explain why it did not meet all expectations. In order to propose a more powerful solution, one has to go back to the roots described by Peter Drucker: Taylor's Scientific Management, which is highlighted in Section 3. In Section 4 the new approach is developed, defining 11 factors to optimise knowledge work. These factors can be grouped into 3 categories: processes, organisation & culture, and information technology. Section 5 and a sub-section for each category describe an environment, where knowledge can evolve and thus defines a practical approach to increase the productivity of knowledge workers. The description allows us to derive interventions. The paper ends with a conclusion in Section 6.

## 2 A Short History of Knowledge Management

Peter Drucker invented the term "a knowledge worker" in the 1960's. There where some discussions around Knowledge Management, but these were mostly driven by

Sociologists like Amitai Etzioni in the 1970's. These terms and ideas were not in the focus of management magazines until the early 1990's, when all major consulting companies started talking about them. What had happened?

I believe that it was two areas in parallel: The limitations in those days of the latest management fad "Business Process Re-engineering" became apparent and laptops hit the scene in the consulting business. The laptops gave the consultants new flexibility to work in a more distributed fashion and more often than not, at customers' premises. The price of that was the loss of informal knowledge exchange with colleagues in the consulting firms offices. That created a real and deep need for new processes of knowledge exchange. The consultants started to like some of the newly created knowledge management processes and projected it to their clients, disregarding, that most of them had not invested in laptops yet and had not modified their work processes.

So it became a fad to have a knowledge management strategy. One of the first – if not the only intervention derived from that paperwork was the creation of a new role: the Chief Knowledge Officer (CKO), at best directly reporting to the CEO. They immediately went to the first KM conferences in the UK or the US by huge numbers. They all only had one question in their mind: "What is my job?" Unfortunately, they didn't received an answer and so most of them resigned from their positions within a year or so. That was Generation 1 of Knowledge Management, for early adopters roughly lasting from 1990 to 1995.

It became even worse with Generation 2 in the following five years: the erroneous belief that knowledge can be codified to a large extent came into managers' minds. The theoretical background for it had been created by the Japanese professor Ikujiro Nonaka. He had published some work on information creation in Japan and since 1991 he used the label "knowledge creation". His 1991 article "the Knowledge creating Company" in Harvard Business Review brought some attention, but the real breakthrough had to wait until 1995, when he published his book, together with Hiroteka Takeuchi, under the same title [Nonaka et al., 1995].

The model he presented was called SECI, which stands for an ongoing process of socialisation, externalisation, combination and internalisation of knowledge. He is partially building upon Michael Polanyi [Polanyi 1962], who had proposed a knowledge continuum between the two extreme states of tacit and explicit knowledge, the first being merely in the brain of people and sometimes even hard to explain or to put in words and the second codified or at least potentially codifiable. There are actually two schools of interpretation: the first see the borderline between tacit and explicit very much in the tacit area, whereas the more pragmatic simply call things not codified yet 'tacit knowledge'. Nonaka, based on system thinking, seemed to claim in his SECI model that knowledge can be moved like a thing between the two extremes. This was well accepted on the software market, where all kinds of knowledge databases and document management systems sold well..

In 1997 H.T. Tsoukas pointed out that Polanyi actually argued that tacit and explict knowledge were not two separate forms of knowledge, but rather, inseparable and necessary components of all knowledge [Tsoukas 1997]. Also Nonaka followed that kind of analysis to a certain degree and more or less withdrew the SECI model in 1998, by introducing a successor that he called "Ba" [Nonaka et al. 1998, Nonaka et.al. 2001]: "Since knowledge is intangible, boundaryless, and dynamic and cannot

be stocked, it has to be exploited where and when it is needed to create values. To exploit and create knowledge effectively and efficiently, it is necessary to concentrate knowledge at a certain time and space. We call such a space ba (roughly translated "place")." Having such a strong esoteric flavour, that model didn't bring about as much interest and, as Dave Snowden points out [Snowden 2000a], it also misses important dimensions like a sense of belonging and social obligation.

With this background it is not really surprising that the codification hype did not meet expectations. In a typical project, first a so called knowledge database was set up. Basic consultancy guidelines like "senior management has to be involved" were taken into account by distributing an E-mail from the CEO with some text like "Today we have launched our first knowledge database. It gives you a chance to share your knowledge and experience with your colleagues. That will save you time and will help to increase the quality of our work. Please join in the effort, ….". Typically, those databases were launched empty in the beginning, just as a tool to exchange 'knowledge'. The result became apparent very fast: nobody felt attracted and the databases stayed more or less unused.

At that point, the consultant normally made the observation that it was very clear that nobody used the database – it did not attract individuals and motivation was missing. So they suggested to implement a permanent bonus system for submissions and sometimes also for reuse. Very often it was organised like the frequent flyer club of the airlines. There were knowledge miles for submission, reuse and sometimes by vote from the readers. An open door for misuse: people submitted slightly modified papers again to double miles or built partnerships in high voting on submissions. For example, Siemens, for long time a strong supporter of such systems [Gibbert et al., 2000], actually stopped it during September 1st , 2002, for many good reasons.

Such bonus systems follow the Hawthorne effect: In the beginning they arouse people's attention, but soon after, they fall back to the previous levels of interest. Confronted with that situation, the consultant only has one excuse: "You have to accept that your company has the wrong culture. It will never work unless you change the culture first". Such a statement makes a cultural change a prerequisite to a successful application of knowledge management, which is ridiculous. The culture of a company is the culture which has lead to its success. Any kind of knowledge management has to start from that existing culture and may not require a cultural change as a prerequisite.

There also exists a central European variation of 2nd Generation KM, created by Gilbert Probst et al. in Geneva [Probst et al. 1997]. Heavily building on system theory, their key process starts with knowledge identification, followed by knowledge acquisition, knowledge development, knowledge distribution, usage of knowledge and knowledge retention. That model makes a lot of sense for data, but more or less misses the fact that knowledge appears in two forms and is not just codified or codifiable.

Ralph Stacey summarises such mainstream models based on system thinking: "This reflects an underlying way of thinking in which knowledge is reified, treated like a 'thing' that can be possessed, that corporations can own. Knowledge creation is thought to be a system and in this view that makes it even remotely plausible, let alone ethical, to talk about managing knowledge and measuring intellectual capital." Instead, he regards knowledge not as a 'thing' or a system, but as "an ephemeral,

active process of relating" and states that "knowledge itself cannot be stored, nor can intellectual capital be measured and certainly neither of them can be managed." [Stacey 2001]. In his Ba model Nonaka seems to pick up from Stacey, and their positions are now coming close.

## 3 Back to the Roots of Knowledge Management

If this Systems Thinking or Nonaka and Probst based approaches have failed to a large extent in real life and the latest theory predicting that they will never work, what is left for Knowledge Management? Is it dead before it really started?

Before answering this, we have to go back to the roots of the question "why Knowledge Management is so important today?" In various books and articles - especially Peter Drucker [e.g. Drucker 1993], he makes clear that we have to go back about 100 years to Frederick Winslow Taylor and his idea of Scientific Management [Taylor 1911]. Taylor and his contemporaries were the first to apply knowledge to work processes. Before, for several hundreds of years, mankind had only applied knowledge to improve tools, rather than to the general productivity of a work process.

Taylor, who did his studies and experiments - mainly at steel companies with manual workers, defined three key principles [Taylor 1911]:

1. The substitution of a science for the individual judgement of the worker
2. Scientific selection and development of the worker
3. The intimate cooperation of the management with the worker, so that they together do the work in accordance to the scientific laws which have been developed, instead of leaving the solution of each problem in the hands of each individual.

To implement these principles, he and his colleagues defined a list of – in those days, brand new - elements: Time studies, functional or divided foremanship, standardisation of all tools, a planning room or department, the "exception principle" in management, the use of slide-rules and other time saving implements - instruction cards for the worker, the task idea in management, accompanied by a large bonus for the successful performance of the task, a routing system, etc.

The key element though, is the division of work into a doing level – the worker – and the management level - the foreman or manager and new roles in the new planning room. The worker is assumed not to be able to apply the science to his job himself, "either through lack of education or through insufficient mental capacity." So he is supposed to simply do what the foreman instructs, without any form of thinking or personal modifications, although suggestions for general improvements are always welcome. More rigidly expressed, this means that the process has to be optimised by time studies, etc. and the worker has to be properly "picked to suit to the type of work", - and then individual capabilities or knowledge do not matter.

There always was a lot of criticism about Scientific Management and definitely some ideas were too simplistic, e.g. an individuals motivation to work is just for the money they receive. But overall, it was and is totally successful. With its intensive application, the productivity in the industrialised countries grew year on year by approximately 3.5 percent - a factor of 50 in a hundred years [Drucker 1993]. So it is no wonder that all major management theories of the last century, e.g. Kaizen, Steven Denning's Total Quality Management or the Business Process Reengineering, are all

deeply linked into Scientific Management, basically just by adding components of quality management.

Scientific Management applies extremely well to reoccurring and primarily manual tasks where it is still absolutely valid to apply it. The trouble starts with knowledge work where Taylor's central assumption of the unimportance of individual capabilities does not hold any substance any more. A recent study by Daniel Rasmus of the Giga Group concludes that 80 percent of the knowledge of a firm is personal [Rasmus 2002], which is in accordance with older studies, e.g. by the Delphi Group [Delphi 1998]. So the knowledge of a firm is primarily owned by individuals and is well spread. This implies that it is not sufficient to pick workers who are suited to this kind of work. Instead, it has to be individuals with the right knowledge. In consequence, it does not make sense any more to try to apply Taylor's Scientific Management or its newer implementations to this new kind of work called knowledge work. What is the alternative? Knowledge Management claims to give it, but it is definitely not there yet.

The issue is important and fast growing. If IDC's analyst Gerry Murray was right in 1999 with his forecast for this year, today about 40 percent of the workforce of an average Fortune 500 company consists of knowledge workers – up from 20 percent in 1999 [Murray 1999]. This implies that without knowledge management we would not have an idea as to how to increase the productivity of nearly half of our work force by the typical factor of 3.5 percent year on year - a potential disaster for our prosperity.

So the real question of knowledge management is not how to store some thoughts in the so called knowledge databases, but fundamentally how to increase the productivity of knowledge workers in an ongoing manner or in other words to complement Scientific Management for knowledge work.

## 4 The Principle of Self-organising in Knowledge Work

In an unprinted part of an interview with Laurance Prusak, co-author of "Working knowledge" and founder of the IBM Institute for Knowledge based Organisations, delivered to the German Handelsblatt in May 1998, he said: "You cannot manage knowledge like you cannot manage love, patriotism or your children. But you can set up an environment where knowledge evolves." This summarises the 3rd Generation (or sometimes called post-Nonaka) Knowledge Management. In order to increase productivity we need to understand the work environment of knowledge workers. That means applying Taylor's way of thinking, as opposed to his solutions. In other words to apply knowledge to work, but this time to knowledge work itself.

Peter Drucker's attempt to do so is to impose the responsibility for individual productivity on the knowledge workers themselves and he defines six factors optimising it [Drucker 1999]. The most important is to constantly answer the question: "What is the task?" The big difference of his model to Taylor's is the self organising principle, where the worker himself has to answer the question as to what the task is. In Taylor's Scientific Management the worker's key question was always "how?", whereas the 'what?' was given by the management. In knowledge work the workers have to answer both questions themselves.

Based on Drucker and by applying Taylor's approach to use the knowledge to optimise the work process, I have derived eleven factors, which immediately lead to an optimisation of the work of a knowledge worker [Schuett 2003]:

1. Definition of the task: What is my or the task and am I still on track?
2. Separation of tasks: Does it make sense to divide the piece of knowledge work into separate tasks, which can – maybe in parts – be done better by other specialised people?
3. Flow of tasks: Is working hand in hand well organised?
4. Standardisation of procedures: Have reoccurring procedures, which have a potential for standardisation, been standardised?
5. Output measurement: Is the output measured and communicated to the workers at short, but reasonable intervals?
6. Natural talent and knowledge: Am I the best person to do the particular knowledge task? Otherwise it may be advantageous to share it or hand it over.
7. Work environment: Is the environment optimised for best performance – i.e. noise level, room climate, light, food, comfort, etc.?
8. Support and Training: Do employees easily get the appropriate support and training at all levels in case they require it?
9. Motivation factors: Are the stimuli for motivation well set? They can be monetary, e.g. compensation, bonuses, etc. and non monetary, e.g. status symbols, recognition by peers and partners, attention and all other kinds of social capital. All these factors have to be checked and rechecked for effectiveness on a regular basis.
10. Level of motivation: Is the level of motivation okay?
11. Tools: Are the available tools the right tools? For knowledge workers this has a lot to do with access to information and communications and therefore IT systems.

The obvious difference to an ordinary process optimisation checklist is the standard point of view: it is not the process view, but the knowledge worker's view of his work. All of the eleven Knowledge Management optimisation factors can be categorised into three categories: Work processes (1-5), organisation and culture (6-10), and information technology (11).

For knowledge workers, Taylor's separation of work has to be withdraws, with the effect of only having management mechanisms which were highlighted in the pre-Taylor era. At this point, the question arises - what could we learn from those days? Taylor was so disappointed about what he called the "soldiering" behaviour of the workforces that he pioneered Scientific Management. What he means by "soldiering" is that workers always agree on the lowest level of productivity the employer is still willing to pay for. And he argues that social and even up to physical pressure in groups of people working together is the reason why everybody joins in. The other point he stresses is the very inaccurate rules of thumb measurement system rather than a scientific approach. He tried (successfully) to break the "soldiering" effect by extremely high increases of compensation for individuals taking leadership roles in working after the scientific management rules.

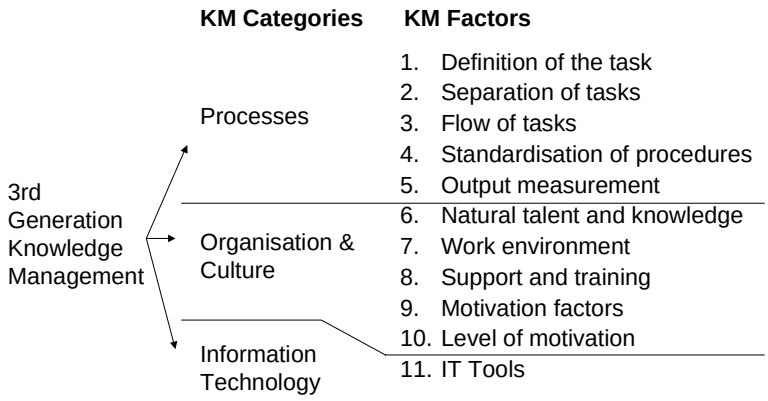


*Figure 1: 3rd Generation Knowledge Management*

## 5 The three Categories of third Generation Knowledge Management

What are the challenges in modern knowledge work and how do they compare? In Taylor's studies the supply of material never was an issue, but it was the key issue in knowledge work. There, the material is knowledge on one hand and data or information on the other. Knowledge, in this sense, is not so much a thing or a higher (quality) level of information, but more a kind of capability to put data into context. This higher level of data, I would call information and that is the basis for most decisions or judgements. Dave Snowden separates knowledge into 5 components [Snowden 2000]: artefacts (things that are documented), skills, heuristics (rules of thumb to take decisions in complex situations), experience and natural talents. The first letters define a mnemonic: the name ASHEN. It makes a lot of sense to consider the components rather than knowledge as a whole. This is extremely useful while optimising processes with knowledge management.

### 5.1 Work Processes

To study the work processes, it makes sense to do an ASHEN analysis [Snowden 2000] first. Apart from natural talent, this will touch the question of what is codified or documented and what, in addition, should and could be codified or documented? As no company can have an interest in collecting data without a need, there has to be a clear judgement of what makes sense. Basically, the same rules that are used in production supply can be applied here: To be cost effective, some has to be "just in time", and others have to be "just in case". Anything that has been documented, follows the very well established, but still evolving, information management processes and might end up in a document or content management system on the company's intranet.

One of the new areas in Knowledge Management is how to handle the other part: things that will or cannot be codified. Here it is linked to single experts or sometimes groups of experts. A "just in time" strategy would enable visibility concerning who

are the expert and in addition would indicate the immediate availability for communications. Whereas the traditional "Yellow Pages" initiatives fail due to two reasons (analysts say that typically only 2/3 participate and only about 10percent keep their data up to date), there are IT systems on the market that can derive such information more or less automatically.

But people might leave the company or change jobs and a company must have an interest to constantly revive key knowledge. There are a few strategies to assist:

1. Communities of Practice (CoP). Such a community is a group of individuals who share mostly on a voluntary basis, knowledge in a business relevant area of expertise. Usually they organise and maintain a "best practice" or "lessons learnt" database. Limited to that the capabilities of CoPs are only used to a small percentage. Physical or maybe even virtual meetings or conferences with a much higher level of trust between individuals add substantial value, e.g. in harvesting innovative ideas and sharing knowledge [see also Schuett 2000]
2. Debriefing processes. Originally invented by the US Army, such processes can help in interactive processes between experts and in addition some supporting documentation to keep such key knowledge in the organisation. An example is described in [Schmitz 2000]. Teaching sessions of such key knowledge owners can have a similar effect.
3. Story telling or narrative is an alternative way to disclose critical knowledge and also to propagate it. It can even be used for interventions, especially in cultural change. [see also Snowden 2001]

The ASHEN analysis will also bring up the question as to whether there are the right people involved in the process. This immediately leads to the question of what is the knowledge of the individuals in the company. Some companies invest in IT driven Skills Management Systems, others use the more end user driven Yellow Pages approach. Both usually have limitations in accuracy and availability of data at the right level of detail. Some new IT solutions derive such data from online activities and authorship in documents and e-mails, which gives hope to more reliability. A CoP network can also be a good and very trustful source of such information.

For any knowledge work it is always important to stay focussed on the task. With a certain probability, different people will create different solutions to do a new task. Such a variety of individual solutions might be okay initially, as it stimulates innovation. But, if the process occurs more frequently, it is essential at a certain point in time to understand and extract the best way to do it. Communities of Practice can help to identify such "best practices" even in large groups of knowledge workers. That can lead to more efficient standardised procedures, which can and should be taught to the whole community.

### 5.2 Organisation and Culture

Taylor suggested the clear separation of workers and the management including functional foreman. Simplified, the worker's task is to work and the management's task is to think and to take decisions. This was the basic law of most organisation's throughout the last century. It defines a clear hierarchical structure which is still the best in areas with mostly repetitive work, e.g. in modern mass production processes.

Peter Drucker compares such an organisational structure with a baseball or cricket team [Drucker 1993]. Everybody plays on a team, but performs alone by himself. In baseball, the outfielders never assist each other. The team leader or manager typically is the best skilled person on the team and takes the decisions.

This structure turns out not to be flexible enough for today's complex and high speed business processed with constantly changing requirements and challenges in many areas. Complexity is the domain of knowledge workers. For them, Drucker suggests the organisational structure of a soccer team, where they really work as a team, as everybody coordinates his or her part with the rest of the team.

Expanding on this, this metaphor is even more powerful: For a soccer world championship the coach takes 20 players to the training centre, although he will only need 11. There he observes what works and what does not work. At that point in time, all players are little Me Inc. and compete to each other as if selling themselves on the open market. A player who hides his capabilities has no chance of getting nominated – the "knowledge is power" strategy is definitely not the way to get nominated. Also someone who does not fit in with the others has no chance and it does not matter how good a shape he is in – he operates as a single person. This translates to some extent to "not invented by myself" and again this is the ticket to leave. The moment the coach selects the final team, the competition is decreased by magnitudes and the team target takes over: it is simply to win as a team.

The manager does not necessarily have to be the best player. He or she is the coach and has other tasks:

- Identify and support the best patterns. In this example, it includes focus topics, training needs, relationships, motivation, attention, final goal settings of the team, etc.
- Define the tactics

Like a soccer game, a company is an even more of a complex thing. Dave Snowden's Cynefin model goes much deeper into sense making sense in complicated and complex structures and what kind of effects moving around the boundaries can have on an organisation. "In a complex domain we manage to recognise, disrupt, reinforce and seed the emergence of patterns; we allow the interaction of identities to create coherence and meaning" [Snowden 2002]. That is how he describes the new approach on how to manage a firm.

This is a different kind of management compared to systems thinking in traditional (Scientific) Management. The baseball-soccer metaphor also explains that to reach the highest height in a knowledge economy, you cannot simply apply Taylor's kind of management with some cosmetics, e.g. so called motivation systems. It requires openness to new organisational structures that look more like an (internal) market place than like a parade ground. Many companies have completed this move or are well on the way. One example is IBM, who started in the 2nd half of the 1990's.

### 5.3. Information Technology

Information technology is a service to be used by knowledge workers and others – at best, largely personalised and on demand. What does a high performance IT work environment for knowledge workers look like? IBM has developed a powerful

approach today called the “On Demand Workplace”. It is based on the five key relationships of knowledge workers:

- to the roles
- to colleagues
- to staff organisations
- to external parties – e.g. customers, suppliers and partners
- and to oneself

In their job roles, knowledge workers have a high need for data/information. The way of accessing information has not changed since the early days of computers and has become an obstacle these days. One has to know in which application and where inside the application, the information is available and sometimes one even needs a password to access it. Apple or Windows did not really make it simpler by enabling individuals to open the application by clicking on an icon. In some sense it even became worse as often special client software was needed. This paradigm of information access is confusing and increases the complexity at the workplace. There is no added value to know in which application certain information is kept.

New portal technology radically change this paradigm: The traditional applications are moved to the back end and their information is presented well grouped in context of the content in a browser. With full integration the user interface will be just one across all information compared to several different client user interfaces in the past period.

IBM has added another new concept to limit the complexity of information access: People will spend their work hours in different “centres” depending on their actual focus in terms of span of attention, scope of interaction and diversity of tasks. Back end applications will be integrated multiple times in different centres, depending on the actual importance within that environment.

Knowledge exchange today largely suffers from the very limited number of people that are involved e.g. in decisions or answers to customer requests. Typically, people involve colleagues they know and at least sometimes meet at the canteen. This is not the way best practices work. There are alternatives: New advanced collaboration tools work with non documented tacit knowledge in much the same way people are used to working with documents. On a search request, such tools list documents and people with an affinity to the topic in parallel. For the people, their actual status of presence awareness is also indicated and allows immediate access to their knowledge, assuming there are willing to share. Secure Enterprise level Instant Messaging and Web Conferences as well as virtual team rooms compliment the picture.

Knowledge workers should have the chance to concentrate on their key tasks as much as possible. Anything else should not distract them or if it does - only at minimal levels. HR self service components as well as self service education management, etc can make their life easier.

In the relationship to external audiences, the transactional aspects stays in front, but collaborative commerce and advanced collaboration functions get more and more important, especially in the area of complex decisions. The final relationship to oneself addresses the work-life balance of a more flexible style of working, which seems to play a more and more important role for knowledge workers.

## 6 Conclusion

This paper presented a brief overview of the detour of the first two generations of knowledge management and proposes an implementation of a post-Nonaka version based on the three category processes, organisation & culture and information technology. Knowledge Management aims at increasing the productivity of knowledge workers and in this way, extends Taylor's Scientific Management. Where Taylor's model is limited to reoccurring tasks and cannot be applied reasonably to knowledge work, his way of applying knowledge to work allows one to extract 11 factors to optimize knowledge work and increase their productivity.

Based on the factors and more detailed description of the three categories, a whole set of interventions is proposed by examples, but there is no reason to start them all at once. They all bear potential enhancements to specific situations in an individual manner. Maybe in a few years, with more experience, some generalised interventions will be defined. As of today, even 3rd Generation Knowledge Management is still a very individual initiative which includes many questions of balance and judgement. But documented cost savings and performance enhancements of examples like IBM indicate the urgency to get started.

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