2. Why we need a new approach

> *"The health, competitive power, and even survival of an enterprise largely depends on its ability to understand and harness the power of knowledge workers who are enabled to take responsibility for providing automatic solutions to meet many of their business needs."* – SOA meets situational applications: Examples and lessons learned, IBM System Journal, July 2008

Let's start by taking a look at the need to change.

In this chapter, we will look at:

- why knowledge workers have become the most fertile area for improving company performance;
- why the unique world of the knowledge worker requires a very different type of information systems than we have built in the past;
- why the new generation of knowledge workers will insist on a new approach;
- why the speed of change requires us to take a very different approach to building information systems than our current methodologies allow for;
- why the holes we have in our information access causes so much (hidden) wasted time; and
- why it is not feasible for IT alone to address these needs.

The growing value of knowledge workers

> *"An important scientific innovation rarely makes its way by gradually winning over and converting its opponents…. What does happen is that its opponents gradually die out and that the growing generation is familiarized with the idea from the beginning."*—Max Planck, The Philosophy of Physics, 1936

Knowledge workers now make up the majority of both the operating expense and the competitive advantage of most organizations. Knowledge workers are also the area where organizations most often realize competitive differentiation—where they design products, support and retain customers and partners, minimize risk, and maximize profit. Their productivity is quickly becoming the key factor in determining profitability in today's economy.

The productivity of knowledge workers is not just a *Fortune 500* business problem. Small companies need better ways to manage knowledge workers even more, because they have to be even more flexible, more responsive, and more "right" (that is, make better decisions) — even small mistakes can be fatal to them.

The value of the knowledge workers will continue to grow as a result of factors such as:

- The **growing need to reduce costs** at a time when increasing revenues is hard to do. The middle-office, the primary home of knowledge workers, is a fertile area to try to reap efficiencies—back-end systems like ERP only directly touch a fraction of employees in the organization and of those employees they do touch, they only touch them a fraction of the time. The **increasing ratio of nonstandard to standard tasks**. Problems that can be completely standardized are either being fully

automated, removing the human from the loop, or, through the use of self- service technologies, are being delegated to users outside the organization. Take, for example, checking in at the airport. Before the advent of self- check-in, service representatives were needed to handle all check-ins, most of which were standard and required relatively little knowledge. Only exceptional cases needed to be handled by supervisors or "experts." Now, all standard check-ins are automated and only the exceptions remain, thereby eliminating the need for low-knowledge service representatives. To be successful, these workers need the right tools to meet the unique needs of customers and situations that might arise.

- The **increasing role of knowledge workers in evaluating net worth**. When Peter Drucker proclaimed the age of the knowledge worker, he predicted that competition in business would be all about the management of knowledge resources. The tangible value of knowledge workers is apparent in evaluating the net worth of an organization, where knowledge and related intangibles now account for the overwhelming proportion of the average corporation's perceived worth.
- The **potential revenue from selling "virtual knowledge packets.**" The advent of new technology provides organizations with an unprecedented opportunity to package and sell their knowledge. It is the next logical step, and it will lead to the significant increase in the value of knowledge workers.
- The **increasing amount of information** that needs to be dealt with on a day-to-day basis, including the growing complexity of rules and regulations that need to be adhered to in the complex global world.

- The **increasing dispersion of the workforce across time and space** makes the smooth transition of work from one employee to the other increasingly difficult to manage and control, and increases the potential lag time between events happening and the relevant people/systems being aware of them so they can take the necessary action. Much looser organizational structures require technologies that support virtual teams of specialists scattered around the globe who can collaborate independent of location, time zone, technology, or language. These technologies must also support the instant reconfiguration of such teams. Teams that are formed quickly must be able to define their work environment and address many of their own needs as they arise.

The complex world of knowledge workers

> Knowledge workers are the last remaining bastion of untapped productivity.

The productivity and effectiveness of knowledge workers are increasingly critical factors in determining the fate of the 21st century organization. But their world is quite different from the world that IT has supported in the past, and a new approach is needed to make these workers succeed.

These solutions need to take into account the different world of the knowledge worker:

- **The knowledge worker's environment is dynamic and unpredictable**. Their actions and decisions are often driven by unexpected events and exceptions to documented business processes. They have to deal with the growing amount of

information and the growing complexity of relationships and regulations in the global economy. To succeed, knowledge workers have to respond instantly to continuous changes, often relying on their know-how, personal relationships, and unique understanding of their environment. This tacit knowledge is not easy articulated or codified.

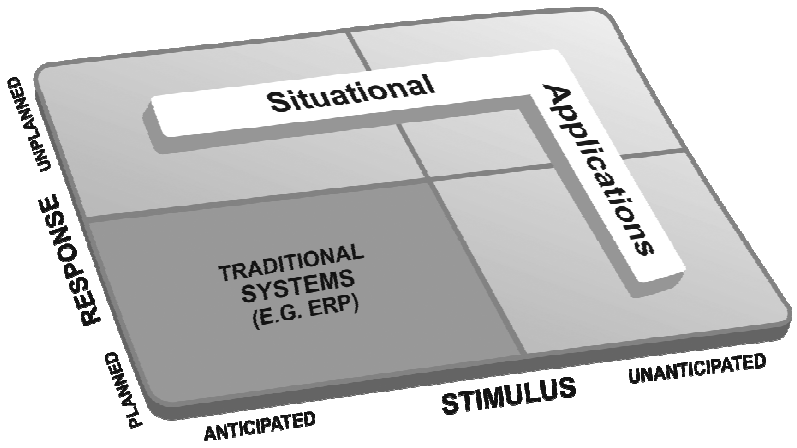

Figure 1: The knowledge worker lives in a world beyond the bottom left quadrant, buffeted by unanticipated events requiring unplanned responses. Address the three quadrants outside of standard, rigid transaction-based systems that respond to anticipated business stimuli requires something far more flexible and dynamic than the solutions available to date.

Today, employees address these quadrants with a combination of email, spreadsheets, and word processing tools to help them coordinate their work and maintain focus on the tasks at hand.

- **Knowledge workers need the ability to approach their activities in the way they feel most comfortable.** Knowledge

workers have individual learning and communications styles; "one- size-fits-all" is not appropriate.

- **Knowledge workers need to respond quickly to constant change**. The world of the knowledge worker is always in flux. Therefore, in order to effectively adapt, they need to be able to do things like modify rules without waiting for IT to take action.

- **Knowledge workers get overlooked** because the cost of automating most knowledge worker-related processes is far greater than the expected savings or productivity gains (using traditional methods). Because specialized applications are so expensive to develop and maintain, only the most critical and expensive processes tend to be tackled—payroll, sales order processing, etc.

- **The knowledge workers world is not easily accessible to outsiders**. Many knowledge workers would argue that there is no common structure and flow to their work. Since their work is more variable and unpredictable than production or administrative work, if you want to understand it, you have to look long and hard. Much of what they do is invisible—it takes place inside the human brain.

- **Knowledge workers don't like to be told what to do**. Knowledge workers are like artists. They want (and usually need) creativity and variation in their work, and often resent attempts to "streamline" or automate their work in any way—especially when imposed from the outside. The belief that processes can be imposed on knowledge workers is particularly far-fetched.

- **The knowledge workers world is full of exceptions**. In back-end systems, like accounting, exceptions should be extremely rare, and can therefore be dealt with manually, with relative ease. For front-end systems like ATM transactions, again, strict procedures are crucial for success. The whole idea of these systems is that they can be totally automated. In the world of the knowledge worker, things are much more messy. People like to tinker, to change things. People are unpredictable. Exceptions are a way of life and too numerous to be planned for in advance. This is a world very much disconnected from the world of transaction-based systems.

The changing workforce

> "*How ya gonna keep 'em down on the farm after they've seen Paree*?" – song by Young, Lewis, and Donaldson

When computers were first introduced into the workplace, they were viewed as mysterious and intimidating by many business users. Those users learned the functionality by rote, and never strayed from what they'd been taught.

The way we build information systems today still assumes a workforce that is computer illiterate. Users must be provided with everything they need and are given little ability to create their own solutions (other than standalone, desktop applications for their private use).

But this assumption no longer applies. Not only are we seeing a very new type of worker, one that is much more computer literate, but

even the older workforce is becoming more IT savvy and capable of more than we give them credit for.

But it's even more than that. The Millennials flooding the workforce have different expectations, skills, and values. After all, they are the first generation to grow up with IT as an inseparable part of their environment.

Their characteristics include the following:

- Because they are used to **customizing and individualizing** everything—from phone ring tones to their Facebook pages - when they move into a workplace, they translate these experiences into wanting to select their own tools, customize their environment, and take responsibility for automating as many activities as possible.

> *"This generation [Millennials] is exceptionally curious, self-reliant, contrarian, smart, focused, able to adapt, high in self-esteem, and globally oriented. These attributes combined with [Millennials] ease with digital tools spell trouble for the traditional enterprise and the traditional manager. This generation will create huge pressures for radical changes in existing companies."*
>
> —Don Tapscott,
> Growing up Digital

- They tend to be highly **creative, collaborative, and have little or no patience** for established lines of authority. They won't want to wait for IT to get to the bottom of the application development priority stack. For this generation, a situational approach to building systems will seem natural. Many will have gone through programming classes in high school (and even junior high) and college. They know what can be done, and they are

not going to know what the big deal is to write a system to meet the needs of their job. With the right tools, they can do it themselves.

- They **live and breathe innovation**, constantly looking for ways to do things better and therefore expect constant change. Unafraid of the technology, they are constantly trying to push it to the next level.

- They are **the ultimate "now" generation**. The interactivity and speed of the Internet have greatly increased the process of communicating. This generation views the world as 24/7 and demands real-time and fast processing—the idea of waiting weeks (or even hours) for a response is just not in their worldview.

Millennials will automate their work themselves whether management likes it or not. Therefore, it is much better to facilitate these efforts than sweeping them under the carpet. It is an opportunity—it should be used.

By the same token, those companies that force its employees to go through IT to get systems built are not going to get the best and the brightest. The reverse will be true—providing an environment that the younger members of the workforce can thrive in will attract the right kind of employees.

Power User 2.0

- Extremely tech-savvy
- Proactive - just do it!
- Used to doing things their own way
- High expectations for software based on use of Facebook, etc.

- Nintendo logic – willing to engage in trial and error
- Expects instant results
- Expects an entertaining, dynamic user experience
- Expects software to be highly customizable to their exact needs

The need for speed

> *"When change within your organization is slower than that without, you're in real trouble. We can't predict the future, but we can learn to react a lot faster than our adversaries."* - Jack Welch, ex-CEO, GE

The challenges faced by knowledge workers is compounded by the relentless, endless compression of "float" - the time between what was and what is to be, between past and future.

Not too long ago, a check would take a couple of weeks to find its way through the banking system. This "float" was used by many to their advantage. Today, of course, money can move through the system instantaneously, and this has resulted in significant impacts on the world of finance. Similarly, we have witnessed the disappearance of information float. In the past, it took significant amounts of time for information to travel. It took centuries for information about the smelting of ore to cross a single continent and bring about the Iron Age; during the time of sailing ships, it took years for that which was known to become that which was shared; it took decades for the steam engine and automobile to attain universal acceptance. It took years, too, for radio and television to become pervasive. Today, countless devices utilizing microchips leap virtually overnight into universal use throughout the world.

Organizational responsiveness and effectiveness are increasingly moving targets. No situation or challenge is the same as the last one. To be effective now and in the future, organizations must be able to adapt existing ways of working to new challenges with speed and agility that was unimaginable even two years ago. Technology needs to allow companies to act appropriately and competitively regardless of the situation—without long lead times or high incremental expense.

The need for continuous improvement and innovation

> *"The days of market stability and competitive advantage from a single innovation are over. Today, companies must respond to new entrants in their industries that come from nowhere. And they must not just innovate, they must set the pace of innovation, gaining temporary advantage, one innovation at a time, and then move on to the next."* – Peter Fingar, Extreme Competition

Kaizen (Japanese for "improvement") is a Japanese philosophy that focuses on continuous improvement throughout all aspects of life. When applied to the workplace, Kaizen activities continually improve all functions of a business, from manufacturing to management and from the CEO to the assembly line workers.

Kaizen is a daily activity, the purpose of which goes beyond simple productivity improvement. It is also a process that eliminates overly hard work, teaches people how to perform experiments on their work, and how to learn to spot and eliminate waste in business processes.

People at all levels of an organization can participate in kaizen, from the CEO down, as well as external stakeholders when applicable. The format for kaizen can be individual, suggestion system, small group, or large group. It is usually a local improvement and involves a small group in improving their own work environment and productivity. This group is often guided through the kaizen process by a line supervisor; sometimes this is the line supervisor's key role. (This role will be played by a Situational Application Analyst as described later in the book).

While kaizen usually delivers small improvements, the culture of continual aligned small improvements and standardization yields large results in the form of compound productivity improvement.

Situational applications can perform the role of kaizen for knowledge workers by allowing them to make continual changes in their work using software.

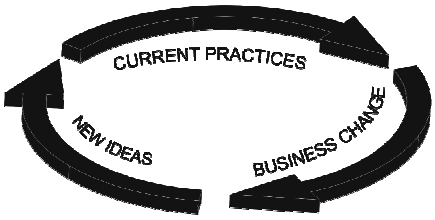

Figure 2: In a healthy organization, current practices are continually being updated to adjust to business changes and to implement new ideas.

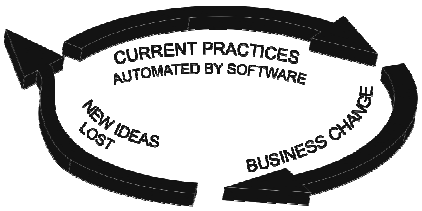

Figure 3: If software applications and processes are not easily adjusted to change, the process of continuous improvement is disrupted.

But while the ability to sense and respond to market change is critical, it is not enough. The ability to also anticipate customer needs, and shape markets, will become the core competencies for successful companies, large and small.

What's new is that it is no longer simply a question of coming up with clever new products. Now, the ability to innovate with services wrapped around those products becomes critical. A large-scale example of this is a service like OnStar, which allows a car company to sell you not just a car, but an ongoing service that provides "peace of mind on the road."

There is a need to go beyond just delivering products or services by offering unprecedented convenience and affordability to customers, and even, as Starbucks has taught us, delivering experiences that command a premium.

And there is a need to do it continuously. As Peter Fingar has pointed out:

> "The whole notion of being able to set the pace of innovation in your industry becomes a radical thing that you have to be able to do, otherwise you immediately get commoditized."

Situational applications offer the kind of self-service, continuous trial-and-error experimentation that is necessary in order to discover what works and what doesn't in a manner that is low cost and fast.

The high cost of not finding information[4]

Having the right information at the right time – and *understanding where it came from and the context in which it was created* – is more critical than ever. The most extreme example of this of course is NASA's Mars Climate Orbiter spacecraft, which just disappeared one day after flying nine-and-a-half months and 416 million miles flawlessly. It turns out that unbeknownst to the metric-based NASA, its contractor had submitted acceleration data in pounds of force instead of the metric equivalent, newtons. By not converting the pounds to the metric measurement, the spacecraft was lost.

Everything from market analyses through product design through decisions to invade other countries – all these things are based on having the right information available. The very complexity of the decisions we make and the products we manufacture makes it impossible to check, test and retest them adequately enough to be sure that they will function properly in any circumstance. Information disasters are a growing threat, and one that few businesses can ignore.

Information holes

There is a wide range of information holes that we need to deal with:

Lack of context

Information disasters are caused not necessarily by the lack of information, but rather by not connecting the right information to the

[4] Susan Feldman, www.kmworld.com/Articles/ReadArticle.aspx?ArticleID=9534

right people at the right time. People use information within the context of what they are doing. They need to have access to the right information, but only when they need it. And they need to be assured that the access is guaranteed, easy, fast and reliable.

Wrong information

Decisions are made based on the wrong information being available. For example, a support person denies a client assistance because the information they have tells them the client has not paid for their support contract.

Missing or incomplete information

It's not just the information itself that is vital to the organization. How the information is exchanged and tracked is important, so that when people disappear, the reasons why decisions were made remain behind.

Too much information

In the extreme case of the Three Mile Island Nuclear Power Plant disaster, for instance, operators had so many error messages thrown at them that they couldn't identify the main cause of the problem.

Scattered information

The information needed is in multiple repositories and databases all over most organizations. No one knows what exists or where it is, and there is no single unified access point to it.

Information overload

We are bombarded by e-mail, copies of presentations, alerts of new interesting articles, meetings and all of the other information trappings

that go with being a knowledge worker. We spend hours trying to track down something that we found only yesterday, but it seems to have disappeared.

The costs of not finding information

So we spend a lot of time spinning our wheels looking for things and not finding them. This leads to:

Bad decision making

There really is no metric we can use to compare the value of a good decision to a bad one. How do we know that a project has taken twice as long as it should have for lack of access to information? The fact is that knowledge workers rarely turn out measurable products, and each project is slightly different from the one before. If they can't find the information on which to base their output, they may have to submit poor quality work to meet a deadline.

Employee burnout

Employee burnout rate may be higher because job satisfaction is low when workers spend their days unsuccessfully searching and reworking information.

Recreating information that already exists

Recent research on knowledge work shows that knowledge workers spend more time recreating existing information than they do turning out information that does not already exist.

Wasted time looking for information

Knowledge workers spend from 15% to 35% of their time searching for information; they are successful in finding what they seek

50% of the time or less; and 40% of corporate users reported that they cannot find the information they need to do their jobs on their intranets.

Lost revenue

There is the potential cost of lost revenue if customers can't find the products they want to buy, and increased call center and online technical support costs because they can't find the answers they need. This is exacerbated when calls are escalated to another person rather than being answered immediately.

Lost creativity and innovation

What we can't do is measure the increase in creativity and original thinking that might be unleashed if knowledge workers had more time to think and were not frustrated with floundering around looking for information.

ITs application backlog and the long tail

The long tail

The concept of the "long tail" originates from an article by Chris Anderson in *Wired Magazine*[5] in which he described the niche strategy of certain businesses such as Amazon.com or Netflix. The Long Tail is the 80% of stuff that didn't used to be worth selling, but now is worth selling because the technology is there to make it profitable.

In practical terms, this means that many individual low-value items can add up to create significant value. For example, a store like Wal-

[5] http://www.wired.com/wired/archive/12.10/tail.html

Mart has physical limitations. Shelf space in Wal-Mart stores is expensive and scarce – it doesn't have room to sell a little bit of everything, so it stocks carefully selected items and makes all of its money selling many copies of these things. In contrast, virtual stores such as Amazon and Netflix profit from the long tail—they don't have any shelf space limitation and succeed by selling just a few copies of many different things. In fact, according to Anderson, Amazon makes 25 percent of its sales, and an even higher percentage of its profits, selling inventory that is not on any retail shelf anywhere.

Applying that concept to applications results in a graph (see below) that shows strategic applications at the top with a long tail at the bottom consisting of situational applications. The level of customization required for the IT department to build small applications for individuals made those applications far too expensive and labor intensive.

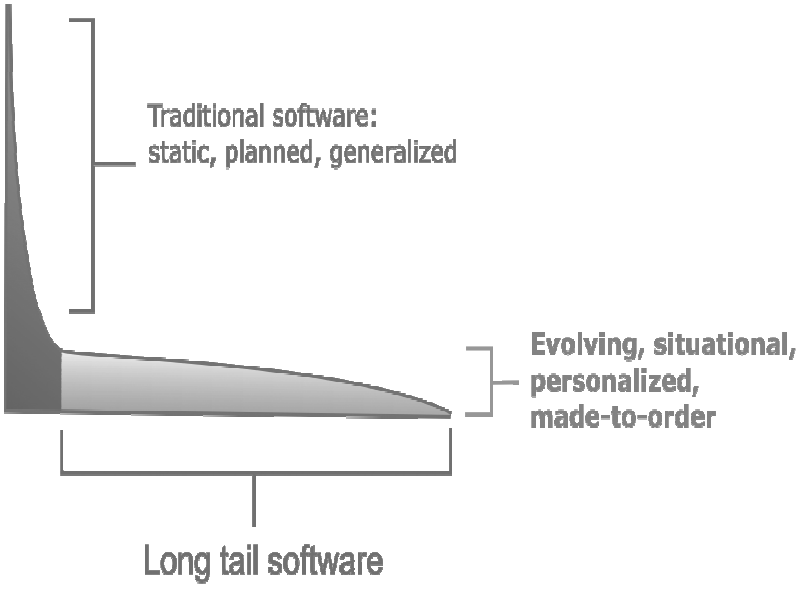

Figure 4: There is a long tail of applications that should be developed but can't be, because the startup and deployment of building them is too high for the perceived value. By lowering these costs, we can make the long tail more feasible.

But the whole purpose of software in business is to support the way an organization does business – from the way a business runs its hiring and firing to the way it orders materials to the way it tracks sales. And while some of these are relatively common in name from business to business (recruiting, for example), in practice, they are usually highly customized.[6] There is therefore a very long tail of software applications that could be built.

However, because long tail applications have small audiences and limited relevance horizons, they tend not to make economic sense given the given way IT is. The startup costs alone make building these

[6] *The long tail of software. Millions of Markets of Dozens* – Joe Kraus. http://bnoopy.typepad.com/bnoopy/2005/03/the_long_tail_o.html

applications prohibitive. By lowering the bar relative to the cost of developing such applications, these applications become much more viable.

By themselves, these low-complexity applications don't compare in ROI to these core applications. But many individual low-value items can add up to create significant value. So while these applications may not individually be cost-effective for IT to implement, in the aggregate they represent serious money in terms of unrecognized cost savings, inefficient operations, and unrealized business opportunities.

It is these small adjustments that are going to make the difference between success and failure in a constantly changing world. Therefore, there needs to be a way to effectively address the long tail.