Excellence in Financial Management

# Discussion Board Articles - Technology

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# Technology

## What is a Data Warehouse?

One of the best ways to leverage intellectual capital is through a Data Warehouse. Intellectual Capital refers to the intangible stuff that creates value for a company, ranging from intuitive thinkers in the workplace to having great strategic partners within the value chain. Intellectual Capital is the main ingredient behind Market Value Added which is the additional value created over time above what was originally invested into the business. Therefore, it is imperative to find ways of expanding and leveraging intellectual capital. One way of doing this is to implement a Data Warehouse.

A Data Warehouse is a central location of data that combines all of the existing subsystems and legacy systems into one single structure. Applying this concept to the management of information is extremely important since most organizations have fragmented pockets or silos of information scattered all over the organization. When everything is located in one place, Manager's can capture all of the necessary information for decision making. Consequently, the main reason for building a data warehouse is to improve decision-making. The benefits of a data warehouse include better customer service, lower production costs, increased profitability, and quicker turnaround times for making decisions. One of the most powerful applications of a data warehouse is to engage in data mining. Take the following example on how to better understand the customer:

*A clothing catalog company with over 2 million customers has decided to mine its databases and develop better customer groupings. Instead of coming up with the usual four or five segments, 5,000 different marketing cells were developed. For example, it was noticed that 850 customers had purchased a blue shirt and red neck tie. This data is important since these same customers are more likely to buy a navy blue jacket than the average customer. It may pay to send a special offer on navy blue jackets to these 850 customers. If the data is correct, the success rate could be as high as 10%.*

One way a data warehouse can improve decision making is to improve the database itself. Business rules can be added to calculate valuable measurement information, such as inventory turnover rates or product margins. You can also eliminate dirty data during the course of building the Data Warehouse. For example, bad customer records, outdated names, and other bad data should be removed when building the Data Warehouse. Things can be done to make the data more user friendly. For example, the customer type code "599" doesn't mean anything, but if you change it to "NPO" it means non profit organization.

There are several approaches to building a data warehouse, such as virtual or dimensional. The dimensional approach seems to work best since it represents a true separate warehouse that is easy to navigate. Some other things to consider when building a data warehouse include:

- Design the Data Warehouse around the strategic goals and objectives of the organization.
- Don't throw all data into the Data Warehouse, load only the useful data.
- Get the best people you can find since design and implementation of a data warehouse is extremely difficult.
- Make sure you allow for growth - the data warehouse will need increasing storage, memory, etc.

This article has touched on the very high points in data warehousing. There is a lot more to cover, but the main point is to start moving in this direction since data warehousing is a powerful tool for leveraging intellectual capital.

## eFinance Part 1: Basic Concepts

It seems that everything now has an "e" in front of it. Finance, like any other function, is subject to profound changes because of e-commerce. This article will outline some basic concepts for moving traditional finance into an e-commerce environment.

In the World of eFinance, complex decisions are made using sophisticated models that demonstrate what destroys value and what creates value. eFinance pulls together all stakeholders behind value-creation: Employees, customers, suppliers, etc. eFinance works 24 x 7 (24 hours a day, 7 days a week), providing instant knowledge to decision makers on an enterprise wide basis.

eFinance, like all e-business applications will consolidate and integrate business processes, sharing and distributing a process electronically for global collaboration. Additionally, financial data is transformed into business rules and intelligence, thereby enhancing the knowledge and intellectual capital of the organization. A database of knowledge, leveraged by mining tools is a major component of eFinance.

The technology for making eFinance happen usually consists of three layers:

1. Database servers that manage the data.
2. Application servers that distribute information to end-users.
3. Clients - Personal Computers, Laptops, Workstations, etc.

The term "client-server" is often used to describe the architecture of eFinance.

eFinance, like all e-commerce applications will involve unique risk:

- Integration of processes into one integrated system is extremely difficult.
- Critical applications may be down, resulting in major interruptions of business processes.
- Loss of personal interaction since everything is now electronic.
- Corrupted or compromised information.
- However, the benefits of eFinance are enormous:
- Increased productivity.
- Faster and better decision making.
- Better collaboration through a consistent, standard process.

One obvious benefit of eFinance is lower transaction cost. For example, according to the International Technology Group, on-line transaction processing can result in the following savings per transaction:

| Activity | Manual Cost | On-Line Cost |
|---|---|---|
| Process Order for Purchasing Equipment | $ 65.00 | $ 6.85 |
| Issue Retail Invoice to Customer | $ 2.77 | $ .88 |
| Process Purchase Order | $ 130.00 | $ 28.00 |
| Customer Query | $ 22.00 | $ 2.32 |

The goal of eFinance is to transform traditional financial functions into value-added services that creates and enhances value. eFinance delivers strategic financial information faster and sooner, not only about what happened in the past, but also giving you forecasts and insights into what will happen next quarter or next year. In today's competitive business world, eFinance has become a matter of survival. Next month, I will touch on some specific components of eFinance, such as e-procurement.

## eFinance Part 2: Key Components

The basic premise for many financial systems will reside in a fully integrated, centralized system. This consolidated system is typically an Enterprise Resource Planning or ERP System. ERP Systems integrate all business processes together, covering a wide range of functions - finance, human resource management, customer relations management, supply chain management, etc. The challenge is to get all of these processes on-line in a real time, global environment. Web based applications are often deployed for meeting this challenge.

For example, e-procurement can be used to streamline the ordering of recurring purchases. No more purchase orders, no more phone messages and other administrative activities. People now spend more of their time finding the best quality supplies at the lowest cost. The best e-procurement applications will automate searching for prices, providing a list of suppliers and integrating the entire process into the ERP System.

Even simple task, such as distribution of financial reports should go on-line through web portals or private intranets. Centralized processing of payments should go on-line, such as paying travel and entertainment expenses to employees. This eliminates the costly manual process and integration takes place directly into the payroll system (part of ERP).

At the high end of ERP is Customer Relations Management or CRM. CRM is sometimes used in conjunction with Sales Force Automation or SFA. SFA will serve to acquire new customers by converting prospects into customers. The process is automated based on pre-defined criteria. CRM works to retain customers through direct personal service. One of the biggest challenges for CRM is to maintain a "personal touch" despite being an on-line service. Technologies such as telephony (voice over IP), real time chat rooms, and other interactive features can help provide the personal touch.

If all of this seems overwhelming, there are some options for rapid deployment at minimal cost. These options are covered by Application Service Providers (ASP's) and Business Service Providers (BSP's). For example, smaller companies may find that www.corio.com can accommodate complete financial accounting through corio's web site. Human resource functions can be outsourced to web sites such as www.employeeservice.com and www.oneclickhr.com. Customer support can be outsourced to www.liveperson.com. Sites such as www.salesforce.com can serve as SFA. Simple on-line storefronts for e-tailing are available through sites such as www.freemerchant.com and www.openmarket.com can even integrate your e-tailing application into your ERP System.

Although eFinance is often seen as limited to things such as electronic payments and distribution of financials, financial professionals may find themselves serving as the driving force behind a host of e-commerce applications. This article has just scratched the surface. Things now change by the hour and financial professionals must play major strategic roles in making eFinance and ERP happen. And to make matters more complicated, the components of eFinance and ERP are extremely diverse. If core competencies are insufficient in meeting this enormous demand for eFinance, then partnering with ASP's and BSP's should be considered.

# The XBRL Revolution

The Institute of Management Accountants calls it the most significant thing to hit the accounting and finance profession since the invention of the spreadsheet. The AICPA, SEC, and other regulatory bodies are racing to implement it as fast as they can. It's called XBRL or Extensible Business Reporting Language.

XBRL is rooted in XML – Extensible Markup Language. XML uses a set of tags to describe the specific data. Now that the data is tagged with a specific description, the user can pick and choose which data to download. All of the detail contained in a set of financial statements is coded, telling you exactly what it is. For example, the net accounts receivable balance is tagged so that users can extract only this bit of information off the financial statement. All users (investors, regulatory agencies, internal managers, analyst, etc.) will be able to pull off exactly what they want from one extensible coded financial statement. And all types of applications can read XBRL.

Some key points about XBRL:

- XBRL is a standard for preparing, publishing, and analyzing financial statements for both public and private companies.
- XBRL is freely licensed so that software companies and various operating platforms can adopt the XBRL format.
- XBRL does not change any existing regulatory reporting requirements.

The SEC has already setup an XBRL repository within EDGAR Online. Vendors like ekeeper.com have released tools for converting to XBRL. Software vendors are starting to incorporate XBRL into their financial reporting applications. The big ERP vendors, like PeopleSoft, have joined the XBRL Consortium.

Some of the major applications scheduled to roll out for XBRL include:

- Enabled consolidation engines to streamline the consolidation of financial statements.
- Conversion and Web Based Tools for pulling multiple financial sources into one single repository.
- Due Diligence Tools to streamline M & A Analysis.

XBRL will change how financial statements are prepared and analyzed. All users in the supply chain will expect XBRL financials. Therefore, financial professionals everywhere need to understand the coming XBRL revolution. For more information, visit www.xbrl.org.

## Comprehending the IT Challenge

For too long, finance has misunderstood and failed to comprehend the true costs and resources required for many IT (information technology) projects. Issues such as migration and integration are simply pushed off to the IT Department to handle. The two functions (finance and IT) struggle against one another. Additionally, finance does not define its role in relation to IT and vice versa; i.e. there needs to be a marriage of strategies. Likewise, some IT projects continue unabated with no supporting value analysis, leading to unacceptable ROI's (Return on Investment). According to Gardner Group, 51% of all IT projects go over-budget by more than 200%.

Since IT is a significant part of a company's strategy and a major driver for best practices, Finance needs to fully grasp the role and strategies of IT. One good starting point is to find solutions that fit with both (Finance and IT) strategies. A fully integrated and seamless end-to-end suite for running the business may provide a solution that fits well with both Finance and IT. For example, many organizations are fragmented with different business units and departments each running their own applications. The end result is a desperate mix of applications and platforms, contributing to enormous bottlenecks in information flow, redundant activities, increased costs, less control over data, and paralysis for the organization when it is forced to change its business model or scale up due to growth. And to compound matters, with each new release of an application, the migration difficulties grow making the IT challenge increasingly difficult.

Desperate Applications and Systems:

Human Resources => PeopleSoft
Financials => SAP
Budgeting => Microsoft Excel
Inventory => Microsoft Access
Customer Relations Management => Siebel
Supply Chain Management => i2
Business Intelligence => Cognos
Web Services => BAE Systems
Directories => Novell
Portals => Plumtree

Suppose we could take this entire mess and put it into one single platform where scalability and integration were built into a single suite of products. Instead of a patchwork of desperate solutions where everyone is doing their own thing, we pull every part of the business together into one system and put a single IT strategy in place that works for everyone. Additionally, we no longer view Enterprise Resource Planning as another IT project; it is now viewed as a rapid business transformation project for removing the enormous disparities that are strangling the company.

What throws a monkey wrench into this whole equation is when management initiates a project that creates disparity, such as a merger and acquisition or a reengineering project. And at the same time, Finance has failed to fully grasp the true costs of desperate systems and how it impacts negatively on the company. Therefore, the Non-IT parts of the business need to comprehend the IT Challenge of trying to turn apples into oranges because of disparity. Turning apples into oranges is not how data should be managed and from an IT perspective, the management of data is how the company gains its competitive advantage.

Now that we understand the disparity issue and its ramifications, let's discuss another common issue confronting almost every IT project – time. In his book Good to Great, author Jim Collins examined all Fortune 500 companies and found that a mere 11 could be classified as "great." One of the most significant drivers for moving a company into the "great" category was time. Great companies took their time, showing high levels of persistence and patience with major initiatives such as IT projects. Contrast this to most companies where there is a mad rush to put some quick solution or patch in place that buys a little more time. Great companies are careful and prudent in making sure technology really fits with the values, strategies, and competencies of the organization over the long run and not the short run.

Collins also points out that great companies use technology (such as Enterprise Resource Planning) to accelerate transformation and not to reinvent the company. IT projects are viewed as complementary to the strategies of the organization and not the essence of the strategy itself. The core values (leadership, customer relationships, innovative products, strategic partners, etc.) that drive the organization have little to do with technology. They have more to do with people and processes with technology as an enhancer or tool to assist with execution.

"The good-to-great companies never began their transitions with pioneering technology, for the simple reason that you cannot make good use of technology until you know which technologies are relevant." – Good to Great by Jim Collins

In conclusion, it's high time for Finance and other management functions to fully understand the real costs associated with desperate systems. Moving to one fully integrated suite of products may not please different departments, but it will have profound positive impacts on improving efficiencies and saving costs on an enterprise wide basis. Finally, don't forget that "great" companies have never viewed technology as the roadmap to reinventing the company. And great companies have always allowed "time" to work in their favor by giving people the flexibility to revisit the entire life cycle of IT – working through continuous iterations until IT really begins to work and mesh with value creation for the organization.

## Leveraging Knowledge Management

It is ironic that so many companies have an abundance of knowledge, but fail to use it for managing the business. Knowledge is a critical resource that warrants much more attention. If we are serious about managing knowledge, then we need to embrace the concepts associated with knowledge management.

"Businesses, especially large ones, have little choice but to become information-based. To remain competitive, maybe even to survive, businesses will have to convert themselves into organizations of knowledge specialist." – The Coming of the New Organization by Peter F. Drucker

Knowledge Management is the process of pulling together people, systems and tools so that an enterprise wide structure is in place for efficient and effective decision making. Unfortunately, many companies view knowledge management as an IT project, trying to move information from one location to another. Although technology does play a role, knowledge management is more about understanding the resource and knowing how to leverage it for growing the business. And yes, technology (such as enterprise portals) is often deployed to help leverage knowledge. However, it may be more important to focus on the information itself – knowing how to classify it and analyze it before you give everyone access to it.

A much better approach to knowledge management is to clearly understand the intellectual assets of the business. This can include simple things like getting more out of databases (a common repository of information) or looking at strategic issues like properly identifying intellectual assets and understanding how they impact the business. The goal is to put the "whole brain" of the organization to work, getting all parts of the body connected and working together for driving performance. This usually requires some form of gap analysis – looking for gaps in your knowledge assets, building knowledge to fill in these gaps, and making sure you are using the knowledge that you currently have.

"Ultimately, intellectual assets have become more important than any other because only by means of knowledge can companies differentiate their work from their competitors."
- The Wealth of Knowledge by Thomas A. Stewart

As author Peter Senge points out in his book The Fifth Discipline, learning organizations are always expanding their knowledge, finding new ways of creating knowledge, moving it seamlessly throughout the organization and transforming it so that people have insights into what they need to do. This requires a knowledge infrastructure, comprised of numerous components such as databases, libraries, internal experts, research centers, outside information brokers, and other knowledge-based sources for plugging the knowledge gaps within the organization. It also requires measuring and managing the value of knowledge so that it truly fits within

the organization. Many companies have created Chief Knowledge Officers or Chief Learning Officers to help propel this process.

Leveraging knowledge management requires much more than moving the stuff around through Lotus Notes. It's about having a culture and infrastructure that supports the knowledge needs of the organization. This requires strong leadership, unlearning of old ways, an openness to new possibilities, promotion of learning, and very seamless communication on an enterprise wide level. This also requires a willingness to learn from others regardless of who they are; i.e. you must be willing to face the truth if you expect to leverage knowledge. In essence, knowledge management is about finding the best ways of running the business. And in order to accomplish this, you must be willing to learn and use your newfound knowledge in new ways for managing the organization. If a company isn't managing its knowledge, then it isn't managing its business.

"All healthy organizations generate and use knowledge. As organizations interact with their environments, they absorb information, turn it into knowledge, and take action based on it in combination with their experiences, values, and internal rules. They sense and respond. Without knowledge, an organization could not organize itself; it would be unable to maintain itself as a functioning enterprise."
- Working Knowledge: How Organizations Manage What They Know by Thomas H. Davenport and Laurence Prusak

## Is Web Services the Next Big Thing?

No technology since the dotcom revolution has received as much attention as Web Services. Imagine a world where business transactions are conducted over the internet with little or no human intervention. Imagine a world where hardware and software (applications, networks, devices, PC's, Cell Phones, PDA's, etc.) are all integrated through the internet, allowing seamless flow of business information across the entire value chain. And the good news is that no major investment in technology is required – existing infrastructures of all kinds are pulled together through a standard model. Such a vision of business is called Web Services.

"Web services will quietly transform the way you do business, whether you're ready or not. A web service application is simply a piece of software that sits between my partners and me and allows all these desperate systems to communicate more easily. So if we can reduce the complexity of connecting systems together, we can either reduce our IT resources or put them to better use to make companies more efficient and competitive."
- Harvard Business Review, September 2003

Let's illustrate an example of how web services can transform what you do. Almost everyone uses the internet to display documents using a web browser (such as Internet Explorer). However, there is limited functionality in how you can use this data

when viewing it over the internet; i.e. you can display it, but you can't download it into a spreadsheet. Suppose we could go around the web browser and place the data directly into a spreadsheet or perhaps, we need to send data to our PDA (Personal Digital Assistant). Web Services is programming for the internet and since everyone and every organization is connected through the internet, the potential is enormous.

"Web services technology – which represents the next stage in distributed computing – will profoundly affect organizations in 2002 and beyond. Almost every type of business – from small organizations to large, global enterprises – can benefit from web services. Companies are already implementing web services to facilitate a wide variety of business processes, such as expediting the development of corporate software, integrating applications and databases, and automating transactions with suppliers, partners, and clients."
- Web Services: A Technical Introduction by Deitel & Associates

So how does it work? Web service's relies on a protocol called XML or Extensible Markup Language. XML places descriptive tags around data, making the data portable across all kinds of platforms and applications. From an IT (Information Technology) perspective, XML is the language for processing business transactions. Besides XML, web services uses three other protocols:

- SOAP (simple object access protocol) provides the instruction code that gives the XML data processing power in the web service world; i.e. we need to submit request, process the request, and get a response back.
- UDDI (universal description, discovery and integration) provides a directory of web services, similar to how you look up a business in the Yellow Pages.
- WSDL (web services description language) provides a description of the web service so you can distinguish different types of services being offered by service providers.

"There is much debate as to whether web services are an evolution or a revolution. My view on this issue was expressed in the title of a column I wrote for IBM developerWorks. The column was called 'The Web Services (R)evolution' because I think that web services are both an evolution of distributed computing and the launch point for a revolution in the way we think about building large scale systems."
- Web Services: Building Blocks for Distributed Systems by Graham Glass

Before you rush out and launch a Web Service Project, some words of caution are in order. Web Services has failed to really take off due to issues such as reliability, security, and scalability. Also, XML is a sword sharp at two ends – it makes data very portable, but it can more than double the data load since everything is wrapped in a descriptive tag for processing. Additionally, web services seems to be stuck as a basic message processing service, unable to handle business transactions that require logic and business rules.

However, for businesses that rely heavily on technology, web service's warrants some serious attention. Just like when the Personal Computer was introduced, the potential of web services is significant. Therefore, if you are serious about technology and business processes, then you need to keep web services on your technology "radar screen" since it could be the next big thing.

"Web services are much like the magic stone in the folk tale about stone soup. As the story goes, a soldier comes to a small town where there is little food. The soldier declares that he has a magic stone that would make a great soup. The villagers, one by one, not wanting to be left out, bring meat, vegetables, and spices to add to this magic soup. In the end, they all enjoy the soup and everyone marvels at how wonderful a meal could be made from nothing but a stone."
- Brave New Apps by Robert P. Lipschutz, PC Magazine, October 1, 2003

## Start Thinking in Nano's

Breaking things down to the smallest units, namely the atom, is creating a whole new way of thinking. If we can change matter itself, then this changes how we make everything from soda pop to skyscrapers. This whole phenomenon is referred to as Nanotechnology. Although one can argue that Nanotechnology is still years away, it's starting to creep into many products – nano-particles that make clothing resistant to stains and automobile bumpers that are twice as strong with half the weight. Therefore, everyone in business better start thinking at the nano-level.

The term "nanotechnology" was popularized by K. Eric Drexler back in the 1980's. Drexler conveyed a vision of building things atom by atom, moving away from a world dominated by bulk manufacturing technologies. Although one can argue that Drexler's vision is still years away, nanotechnology is starting to take hold in numerous ways, giving rise to everything from nanomedicene to nanobombs.

For businesses, nanotechnology is not just about making new products, but also about making all products in a different way. Manufacturing processes will be radically more accurate on the atomic scale. This will unleash more flexibility in how we build things. Production systems will go from the current macro-level to a new micro-level. Therefore, nanotechnology will lead to much lower production costs and much faster production times. And since nanotechnology has the potential to impact almost every product type, it is labeled as a "general-purpose technology."

"Nanotechnology will require you to radically rethink what your core business is, who your competitors are, what skills your workforce needs, how to train your employees, and how to think strategically about the future. The buzz surrounding nanotech is comparable to that at the dawn of the digital revolution, which changed the face of how business operates. Unlike the internet, however, which applied new technology to many old processes and businesses, nanotech is about creating entirely new

materials, products, and systems (and therefore markets), as well as making existing products faster, stronger, and better."
- The Next Big Thing is Really Small: How Nanotechnology will Change the Future of Your Business by Jack Uldrich with Deb Newberry

Nano is defined as one-billionth of a meter (less than the thickness of a hair). With continued advances in science and technology, this micro-level world is now measurable. And now that we can measure things at such a basic level, we can understand it and manipulate it – giving birth to a whole new industry called Nanotechnology. Over 1,000 start-up companies have entered into the nano hunt, creating a flurry of patents for new materials in everything we buy.

Nanotechnology will touch almost everyone in some way – from the use of small-scale machines implanted into our bodies for treating cancer to the use of micro scrubbers for cleaning our air and water. In the future, we will build things with the fundamental building blocks that exist in the natural world, reducing all manufacturing costs down to essentially raw materials and energy. And now that things are moving rapidly from the lab to the marketplace, we all must begin to think in terms of nano's.

"The future of Nanotechnology? It may seem strange now, but within a decade or so the term is likely to vanish from syllabuses and portfolios and remain part of company names only as a vestige of the past. After all, nano denotes only size. Once work on that scale becomes routine, that buzzword will fade. But the physical world – medicines, metals, and even the roles the elements play – will be utterly changed by this revolution, all brought about by bits far too small for the eye to see."
- The Business of NanoTech by Stephen Baker and Adam Aston – BusinessWeek, February 14, 2005

## Welcome to the World of Complex Adaptive Systems

More and more, business is a function of increased specialization. We see this in the form of outsourcing. We also are witnessing how technology is used to respond instantly to the distribution of products. For example, Wal-Mart now requires its top 100 vendors to use smart tags to track inventory items. These smart tags, referred to as Radio Frequency Identification or RFID relies on satellites to pickup the movement of inventory items anywhere anytime. Eventually, we will see this technology at the consumer level, shopping carts displaying your items and amount due as you drop them into the cart.

So what's behind this trend? Many leading experts have characterized it as Complex Adaptive Systems – the next evolution beyond the so-called learning organization. Most businesses are bogged down in major planning activities – things like formal strategic planning sessions. In an effort to break out of this stalemate, many businesses are in hot pursuit of knowledge management, business intelligence, and other techniques to make planning dynamic, real-time, and responsive to the fast

changing world we now live in. But this may not be good enough in such a fast changing turbulent world. Organizations must adapt continuously to a changing environment, similar to how living things adapt in the natural world. This has led to the study of complex adaptive systems and its applicability to organizations.

Nature is always changing and adapting – experimenting with doing something different. These natural variations create some degree of confusion and chaos, but they also help ensure long-term survival. It's worth noting that most variations are useless to nature, but the few that stick make the difference between extinction and continued existence. These lessons have great merit for all organizations - some degree of chaos is natural for ensuring that systems are adaptive, enabling the survival of the organization. The study behind this connection between chaos, adaptability, and survival is grounded in complex adaptive systems.

"How does the natural world create such brilliant strategies? Put simply, nature is constantly considering a massive set of experiments through the generic process known as natural variation. These variations, apparently random in nature, test a wide range of survival strategies – changes in size, shape, color, mating behaviors, food preferences, internal chemistry, and much more. Most of these variations are failure, but a few of them succeed. The lucky few – those gifted with favorable variation – will live longer, reproduce in greater numbers, out-compete other species, and eventually come to dominate future generations."
- Reinventing Strategy: Using Strategic Learning to Create and Sustain Breakthrough Performance by Willie Pietersen

Complex adaptive system's is the study of natural systems – how they interact, adapt, and survive over time. But increasingly, the world of complex adaptive systems is making its way into the business world. We can learn a lot by simply understanding many of the characteristics behind complex adaptive systems:

1. Boundaries are not imposed from outside, but the organism is always testing boundaries, using them as focal points to force needed change for long-term survival. For most organizations, these boundaries represent management hierarchies, department silos, division offices, and so forth.

2. Continuous feedback is always in place to control the complex adaptive system. Two types of feedback take place – positive and negative. Positive feedback elevates the outputs whereas negative feedback would reduce the outputs. For example, as the temperature in your house drops, your thermostat gets the feedback and kicks on your heater, raising the temperature. This is negative feedback – adjusting the outputs up in relation to inputs that are dropping.

3. Emergence not planning is how things really get done. Complex adaptive systems follow certain natural laws or rules, but nothing is formally planned in advance. Unpredictability is a natural event in a nonlinear world. If things are linear, then you can influence the value of outputs through inputs. When confronted with complex

interdependencies, you will have to “emerge” with a solution. For example, the weather is a complex adaptive system and we adjust our clothing according to local weather forecasts (feedback).

4. Small changes in the world of complex adaptive systems are not ignored. These are referred to as “butterfly effects” – small change that ultimately brings about huge outcomes. For example, Enron failed to pay attention to inside warnings about its accounting problems. These small, butterfly type events can mushroom over time and lead to total collapse of the system. In the world of complex adaptive systems, there is extreme sensitivity to butterfly effects.

The world of complex adaptive systems has given great insights into what an organization must do to avoid extinction. For example, in the old days, we bought cameras that lacked film, flash bulbs, and other important sub-systems. Now we buy a camera with everything built in, connected and working together simultaneously. This is one of the lessons for business with complex adaptive systems – the need to get all parts of the business highly connected and working together for rapid adaptability.

If you have a strong command of the so-called learning organization, popularized by Peter Senge in his landmark book The Fifth Discipline, then you should seriously consider the next level of learning - Complex Adaptive Systems.

“To make a healthy organism, you have to put its fundamental systems into balance so the parts are working with each other rather than against each other. Organizations that are out of balance become stuck – unable to move forward. What’s more, Darwin might have argued: Those organizations that remain stuck, become dead.”
- Unstuck: A Tool for Yourself, Your Team, and Your World by Keith Yamashita and Sandra Spataro, Ph.D.