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The Softer Side of Software Development: Strategies for Managing Change

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ABSTRACT

Developers, programmers, architects and project managers in the IT field are familiar with the canons of change. Despite diligent planning for contingencies, insufficient resources, or acts of God/nature, unanticipated change happens — and always will. We will focus on SAS users as the context for perceiving and properly identifying the nature of a change within its boundaries (e.g., technical, administrative/managerial, business, social). Once identified, what challenges will be faced on various “change levels” (individual, team, department, organization)? At each of these levels, what attributes and infrastructures, processes and values contribute to change success? Concrete examples of change within the SAS community and the larger business contexts will be highlighted. We approach change management as a process, not as a set of isolated problems. Systems-oriented strategies to assist the user, the user’s team and surrounding stakeholders will be offered.

INTRODUCTION

As a manager or team lead in a corporate decision support role, consistently improving your team’s value in the eyes of your customers is arguably the most important measure of success. If we were working in static parameters, improving value would be a simple matter of applying knowledge, skills and abilities. But in environments where everything can seem a top priority, where customers’ needs are always changing due to a business climate in flux, where one is faced with a plethora of technology options, improving your value — even maintaining the client perception of adding enough value to remain on the project — can be daunting.

Change has been around long before humans could conceptualize and name it. No doubt those of us who remember programming 30 years ago faced it, but the scope, breadth and depth of change are different today. Increased uncertainty and immediacy are hallmarks of what we call change management in 2004. In some twisted logic, working for a company / client that is relatively “change averse” may lower your stress (and work hours) but an employment affiliation with the “change possessed” seems to increase your career security. Ah, if only we could have security in a place where we choose what, when, where and how change happens.

But then it wouldn’t be change. And here’s reality: Our industry is globalizing exponentially. More and more of us are affected by the importation of cheaper labor and exportation of jobs, the U.S. economy’s ‘rebound’ has not fully reached IT, and we are still getting used to the idea that what we do is increasingly viewed as a cost center. Even the brightest of us cannot keep pace with even a portion of the technology. Diversity within our teams and at our workplaces is not just a matter of equal employment and compliance. It’s now about team processes, agreeing on project plans and managing resources in virtual space or face-to-face. There is more communication than ever before.

The purpose of this paper is to provide you ways to identify different types and levels, ramifications and challenges of change. Our goal is to help you better predict what actions will contribute to change success. In the context of the SAS application developer and team leader, we identify (and empathize with) change dilemmas that we hope offer some degree of familiarity. Although we, as individuals, only have a certain amount of influence when faced with a new organizational or project change initiative, we can increase our knowledge, enhance our ‘market value’, and help others by recognizing the nature, impact, and effects of change. Understanding change in a systems context, as a variable process, will not guarantee our success, but we argue it will increase our value to our organizations, our clients, our careers, and perhaps most importantly to our selves.

CHANGE SCENARIOS

Does your experience relate to either of the scenarios below?

SCENARIO 1 –

You are a decision support manager / team lead who is responsible for developing reports for a new subsidiary. The subsidiary is accustomed to receiving reports via the web, but your company does not have the infrastructure to support that requirement. Using SAS ODS, you know that you can meet their needs because you built a pilot report

quite easily, but your VP of IT rejects that as a solution, deciding to delay indefinitely any web-enablement of reports until a large project is initiated. He wants to continue to deliver the reports in the standard company way: hardcopy via Federal Express. The users at the subsidiary are very distressed at this perceived degradation in their business process, which increases their accounting cycle and time-to-decision. How can you meet your client needs while negotiating the political landscape?

SCENARIO 2 -

You are leading a group of SAS programmer analysts as a manager on the business side of the house. Your use of SAS is primarily for ad hoc reporting, but you have worked with the IT department to productionize some of your monthly and quarterly reports. Over time, your group is becoming more technically savvy as you produce and maintain more and more reports. Your reputation for quick, accurate, and functional decision support adds to the demand for your services. Your business knowledge and SAS expertise are a powerful combination which marks your group as the main source of business intelligence in the enterprise. You continue to maintain your production reports, but you are not comfortable with your group's metamorphosis from analytical, "knowledge worker" function to a hybrid group that is now providing more and more services, historically the purview of the IT department. What should you do to continue providing excellent service without negatively affecting your group's morale or performance, while managing your resources in a prudent manner?

'TYPES' OF CHANGE

Each scenario, above, reveals some of the manager's inner conflict; but each is faced with much more than her own reputation: Her team members' "image" to the wider organization, their morale, how these may affect productivity, perhaps influencing their decision to look for a new job. In the first scenario, subsidiary employees' wants and needs—also affecting morale, productivity, and perhaps turnover—are factors in discerning the scope and nature of the situation. Also there is potential for conflict between the manager and the VP of IT. In the second scenario, assuming the manager's motivation is to preserve the intended purpose of her group, she would be wise to view this situation from a wider vista: How will either remaining available to provide more reporting (IT) services – and less resources for analytics – or pulling the plug on reporting 'services' affect the organization's internal and external customers? Finding out other managers' opinions within the company is usually a good investment of time. For both managers, a discussion of what each perceives to be her group's purpose and deliverables with her respective manager seems advisable.

When assessing change issues, their extent and potential effect(s), we believe it is not necessary, or even helpful in most cases, to "categorize" change into types such as business change, social change, political change, or technical change. Take, for example, the implementation of a new technology. Whether inside your organization or at a client site, all four types of change will happen. Obviously, technology will change. Related to this change, the efficiencies and effectiveness of the business may be better or worse, some people will have redistributed power (due to information access, changed structure or titles), and communication / relationships among people will be altered. Our point is that sticking changes into pigeonholes called 'technology' or 'human' is not only unhelpful but potentially harmful to the change process, how it's communicated and its ultimate success. We've all heard too many times, "Do you think 'they' would think about the impact this change will have on us?"

ELEMENTS OF CHANGE

Go back to the scenarios. What do they have in common? Besides our obvious "Change!" answer, let's pretend we haven't this term in our vernacular. What do these situations share? Usually a change management problem involves these components:

Conflict: Some internal (self conflict), interpersonal (between individuals), intergroup (between groups or departments), or interorganization (between units or companies) or a combination of these conflicts exist. Many times, a change issue involves multiple levels of disagreement.

Fairly immediate need for resolution: Although this varies from situation to situation, most change management issues are, by definition, in need of fast resolution. If they were postpone-able, avoidable or dismissible, we wouldn't address them.

Extreme potential for risk/reward: The resolution or outcome of each situation is important; should you as the character in each scenario fail to assess the entire situation with logic, empathy, and political finesse, you could get fired or you might emerge as a great leader. You could erode the reputation of your team or elevate their value within the company. As CEO, a poorly assessed scenario could mean closing doors and final paychecks or higher stock values and bonuses.

Uncertainty: No change can be assessed without ambiguity. Related to the component above, risk is about uncertainty; however – and this point is crucial – change within and among people does not follow the financial risk adage of more risk/higher reward. Systems thinking is the cornerstone of managing change at work. The more one explores different facets, perspectives, and possible correlations of a change, the lower its risk of failure and the

better chance of success. Still, there are no guarantees; so many variables—economic, financial, societal, cultural, and the human beings involved—cannot be predicted or controlled.

LEVELS OF CHANGE

THE INDIVIDUAL

Change management is rooted in human behavior, attitudes, and values, the stuff of psychology, social psychology. If the change is organizational in nature, its success also typically affects business strategy, structure, culture, and myriad variables outside an organization's control. Even so, we posit that deep and lasting change only succeeds when individuals throughout the organization reckon with their own beliefs and attitudes about the change.

Although our coworkers ostensibly experience the same invitations and pressures to change as we do, there's a good reason for nonconformity when it comes to dealing with change. When we want change to happen and others are resistant, we attribute their resistance to laziness, political maneuvering, stupidity, selfishness...perhaps so, in some cases. But the general case is (surprise!) we are unique. Of course this is not a scientific breakthrough, but many leads and supervisors tend to forget, overlook or lament this simple fact.

Try looking at yourself and the people you work with as sponges. Different shapes, widths, lengths, colors and absorbencies. Absorbency is the most important feature in managing change. Think of absorbency as individual capacity and liquid as change. Liquid can contain good stress (eustress) or bad stress, the kind that we blame for bad habits, poor attitudes and ill health. When no more (good or bad) liquid can be absorbed, no more can be "taken." The point is that each sponge is unique with a capacity that is affected by other stressors we face at home, in non-work relationships, and in our own heads. We sponges are also born with certain abilities and traits. Some of these can be altered; for example a person who is genetically set up to be high strung or an A type personality can actually learn to become less so. The main point is that given our genetic makeup—even when we change that capacity in positive ways—we have other real and imagined stressors in our lives. Our sponge absorbency is never 100% when we walk into a work change situation. Our threshold for even accepting that a change needs to happen, or will happen, varies within a single individual, let alone within an entire department or project team.

INTERPERSONAL LEVEL: SMALL GROUPS AND TEAMS

Even the most remote sponge is part of a bigger ecosystem. Interpersonal relationships are both sources of conflict and creative possibilities. In *The Dance of Change*, Peter Senge (1999) focuses on leadership communities, not the "CEO hero-leader", which he calls a myth. Leadership communities can be nurtured and grow anywhere within a company, but Senge's research calls attention to three types of effective leaders: The local line leaders, the internal networkers, and executives. Local line leaders are accountable for results and have authority to make changes in the way work is organized and conducted at their level. Internal networkers are community builders who nurture broad alliances across the organization; these can be just about anyone: Supervisors, consultants, developers or engineers. Their networks mainly depend on informal channels, not hierarchy. Executives comprise the third category; they are important, but can't make change happen alone. Their most effective roles are investing in new infrastructures for learning/change; being supportive; asking a lot of questions; and leading by example. To begin the change process, Senge (1999) recommends pilot teams. Pilot groups can be as small as five people or as large as a business unit of a thousand or more. Usually headed by local line leaders who are not 'true believers' in systems thinking, they are open-minded pragmatists. Several groups may exist within one company; the change they help create is not authority-driven, but learning-based, drawing others through participation and practical successes.

THE ORGANIZATION

This level of change seems to get the most publicity. Mergers, acquisitions, spin-offs, reductions-in-force...these newsmakers are usually changes imposed on the organization—affecting large numbers of its people. However, organizational change also includes less sensationalistic but impressive, planned, wide-scale change. Take for example organizational culture change, new market penetration, a complete shift into different product and/or service lines...these changes take time and great effort on the part of many. And the catalyst for action, for making it happen, is at the personal and relationship levels; successful organizational change is a hoped for result.

Similar to Senge's belief that leadership does not exclusively apply to executives, Goss, Pascale, and Athos (1998) recommend assembling a critical mass of key and diverse stakeholders as a first step in total organizational change—what they term reinvention. Next, they call for an organizational audit to reveal everything from competitive position to shared values. Once 'undiscussable' company flaws uncovered by the audit are in plain view, a sense of urgency is created. Contention within the organization is encouraged and harnessed into productive conflict that is

addressed; and finally “breakdowns” are engineered to reveal weaknesses in the new enterprise. Change on this scale does happen, but the timeline is long and the commitment deep.

MANAGING CHANGE AS PROCESS

Managing change is, in a broad sense, what we do several times a day as humans. We state the obvious because our focus here is dealing with workplace change that affects or has the potential to affect more than one employee. We begin with a brief description of business and IT processes—frameworks of orderly systems required for business success in general and facilitating change, specifically. Next, we discuss managing change as a more pervasive phenomenon. Managing change is a paradox of discipline and openness, well-defined yet adaptable systems, accountability and creativity. Managing change is not a linear process nor is it based on one methodology.

BUSINESS PROCESSES

In order to be agile, flexible, and continuously improve, organizations need order. Structures like narrow job descriptions and SOPs that resemble case law are not what we mean. Today’s companies require well-defined business processes. We use a practical definition of a business process in this paper as a finite series of interdependent business activities that receive customer input and logically transform the input into an output required by the customer. Business processes are constantly buffeted by pressures from different sources such as government, competitors, technology, politics, and employee turnover. Processes span multiple departments and cannot be seen as isolated handoffs from one department to the next. Functional managers and product managers must coordinate on a continuous basis so that all changes are prioritized and the implementation of a change is influenced to reduce risk and ultimately realize the company’s strategy. We ask that you note two carefully chosen words above. Coordination means that a process is mutually understood before it can be optimized to result in improved effectiveness, efficiency, and quality. We use the term influence instead of “control” because no change can be completely controlled.

IT AS A PROCESS

The IT support infrastructure must be tuned for change. As SAS software developers or managers of SAS applications, we are dependent on the IT infrastructure for providing services that allow us to deliver what our customers want. New technologies are surfaced every day and major version changes like SAS 9.1 require us to plan and execute migration projects. Also, IT departments must accurately assess, then adopt, assimilate, and ultimately retire promising new and emerging technologies into their infrastructures, acting and responding in change-elastic ways. IT executives and their customers benefit from specific change processes and practices that should support both the enterprise’s technology and business goals. The benefits of an adaptive and agile IT organization include the ability to rapidly respond to business changes, improved customer satisfaction, higher IT service delivery capability, controlled total cost of ownership, and optimal IT and business alignment.

CHANGE MANAGEMENT AS PROCESS

The probability of managing change successfully increases with good business and IT processes. However, unlike these two areas, change management has no bedrock methodology. No steps or check lists consistently apply. If and when a desired change takes root is mostly organic in nature and timing. Senge (1999) uses a biological framework for any change management initiative. A seed planted, under the best environmental conditions, will not grow in a linear fashion. Living organisms, organizations included, face limiting factors (natural obstacles) to growth. These limiting factors, translated into challenges faced by pilot teams, are:

1. Control over one’s time: no time
2. Inadequate coaching, guidance and support for innovating groups: no help
3. Relevance; making a case for change: this stuff isn’t relevant
4. Management clarity and consistency: not walking the talk
5. Fear and anxiety; fears of vulnerability and lack of trust: this stuff is %^\$!
6. Receiving negative assessments; problems with traditional measures of success: this stuff isn’t working
7. Isolation and arrogance: “true believers” of change confront “nonbelievers”: they don’t understand us
8. Prevailing governance structure: who’s in charge?
9. Diffusion: an inability to transfer knowledge: we keep reinventing the wheel
10. Organizational strategy and purpose: what are we here for? where are we going?

Of course, different perspectives on change management are plentiful, but change management experts are in agreement on the following:

- Change is a personal process, first and foremost. It requires commitment
- Almost never can one person be the change agent
- Change is shared responsibility but it must be the priority of top management to work
- Change is a value-laden process. Deep change requires examining values, assumptions and beliefs
- Traditional business metrics to measure change success do not work (stock prices, appraisals, financials)

STRATEGIES: (ALL WE ARE SAYING IS) GIVE CHANGE A CHANCE

Change is most challenging and holds the greatest risk (and reward) at the juncture of people and business process. We will first present strategies your organization can use to achieve a level of elasticity that will enable you to keep pace with business process and technology change. Next we will discuss strategies that consider the 'softer' but undoubtedly the more difficult aspects of change—gaining interest, involvement and commitment from employees. Although change management may lack explicit procedures and consistent processes, we offer research findings in four areas that affect and are affected by the management of change: leadership, organizational culture, teamwork and motivation.

BUSINESS PROCESS STRATEGIES

We examine business process along three perspectives: Innovation, incremental improvement, and the project management infrastructure. Software development shops are very good at measuring inputs, outputs, and tools (e.g., requirements, lines of code, function points, bugs, CPU, MIPS). They have deployed a host of measuring and monitoring tools, which in many cases have become a substitute for developing good internal processes. The lack of good process definition and true alignment and integration with the business are key reasons why software development organizations fail to provide the business value that customers want. We can give our customers what they want if we have a process architecture that manages the multiple trade-offs that must be balanced to achieve better, faster, cheaper software development and a closer alignment with the business.

INNOVATION

Process innovation combines a structure for doing work with the goals of visible and dramatic results. It involves stepping back from a process to judge its overall business objective, then affecting creative and/or radical change to realize order-of-magnitude improvements in the way that objective is accomplished. Viewing the organization in terms of processes and adopting process innovations inevitably entails cross-functional and cross-organizational change.

Many firms have found that they can achieve multiple objectives with one process innovation. For instance, customers demand cycle time reduction and output quality improvements, while the competitive and financial environments simultaneously demand that process costs be substantially reduced. Innovation carries with it the highest opportunities for success as well as the highest risks of failure due to its systems orientation. Process innovation does not view problems or improvements at functional levels. It carries the potential for profound change in how an organization does business. Innovation is a strategic endeavor and should be understood and approved before a company commits significant resources in its pursuit.

Innovation may be viewed as too risky by executives whose focus is now on bringing their organizations into compliance with the Sarbanes-Oxley Act. The danger of myopic focus on compliance is the nurturance of a risk-avoidant culture where innovation is stifled. People should know that they will not be punished if they are willing to take reasonable, legal risks in the interest of growing the organization.

Below we offer a high level approach for achieving process innovation. As decision support experts, we are more often than not equipped to recognize when innovation opportunities exist and can then decide whether to champion the development of a solid business case in favor of the change.

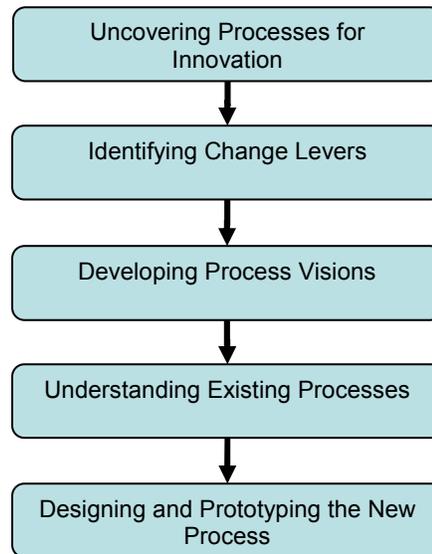


Figure 1 – An Approach to Process Innovation

UNCOVERING PROCESSES FOR INNOVATION

As a manager of SAS applications, you are in an excellent position to uncover opportunities to innovate business processes that you support. It is critical that you surface opportunities within the strategic planning framework to ensure a credible business case and its ROI shows the value of the innovation initiative. Innovation initiatives are run as projects, with a defined start and end, with well-defined success factors. If your objective is for radical process change, we suggest defining business processes as broadly as possible to ensure that improvements are made, including handoffs between functions. Once you have determined the start and end of your processes, you must assess the strategic relevance of each process. Processes that are most central to the organization's strategy should be selected. The health of each process is also assessed in order to target processes currently problematic and in need of improvement. The last step in the selection process is to qualify the cultural and political climate of the target processes. A committed sponsor and pressing business need are necessary to successfully launch an innovation initiative.

IDENTIFYING CHANGE LEVERS

Change levers are the tools or enablers that an organization employs to make improvements in their business processes. Change levers include technological, informational, organizational, and human enablers. Technology can have a profound impact on an organization. Most significantly, it can automate or remove human labor from a business process. Technology can also capture process information that improves service levels and efficiency. Without technology, some processes have to be performed sequentially. Technology can transform a process from sequential to parallel in order to reduce process cycle times. Tracking is another purpose; trucking firms use GPS devices to know the precise location of each truck in their fleet.

Technology can also bring to bear sophisticated analytical resources that permit more data to be incorporated into the decision making process. This is what business intelligence is all about. Technology can overcome problems associated with geographical dispersion, assist in case management, and the integration of cross-functional processes. Knowledge management is also enabled by technology. Many companies are building collaboration spaces where expert knowledge can be managed and made available across an entire firm. And, technology is disintermediating, in other words, human intermediaries are inefficient in passing information between parties in structured transactions such as house hunting, stock brokerages, and parts locating. Electronic trading can save stock buyers and sellers hundreds of millions of dollars.

Information plays many roles in improving and innovating processes, including performance monitoring, integration across and within processes, and process output customization. Some information-related processes include strategic performance management and operational (transactional and unstructured, knowledge-based) processes. If process innovation is to succeed, the human side of change cannot be left to manage itself. Organizational and human resource issues must be more central than technology concerns to enable behavioral changes that render technology processes successful. Organizational enablers fall into the categories of structure and culture. A powerful structure for innovation is the cross-functional team. Cultural enablers include empowerment, or the delegation of responsibility, authority and encouragement to exercise human initiative. Human resource enablers

include training in new skills, hiring policies, compensation based on performance, alternate career paths, rotating people through various jobs, and instilling a lifetime employment policy (given good performance). Employees who trust that they have jobs for life are much less worried about designing or performing their jobs out of existence. After some enablers have been identified as relevant and explored in a preliminary fashion, the organization can begin to construct a vision for the new process.

DEVELOP PROCESS VISIONS

The visioning process begins by asking the question, “How could we do things differently?” The answer to this question is applied to a high level, initial vision statement that addresses the overall process. The next question to be answered is “How will it work?” This will define the key process characteristics that include the flow, output, performance, organization, and technology components. The next question is “How well will it work?” Performance measures and objectives need to be in place here to answer that question. Some performance metrics could be cost, quality, cycle time, and responsiveness. We next have to ask, “What things have to go right?” This question addresses our key success factors around people, technology, and product. The final question addresses risks: “Why might they not go right?” You must list the potential barriers to implementing the new process vision. These may include resource allocation, organizational, cultural, technical, product, or market/environment factors.

UNDERSTANDING EXISTING PROCESSES

There are at least four reasons to document existing processes before proceeding with a change innovation.

1. Understanding existing processes facilitates communication among participants in the innovation initiative. Models and documentation of current processes enable those involved in the innovation activities to develop a common understanding of the existing state.
2. In most complex organizations there is no way to successfully migrate to a new process without understanding the current one.
3. Recognizing problems in an existing process can help ensure that they are not repeated in the new process.
4. An understanding of the current process provides a value measure of the proposed innovation.

DESIGNING AND PROTOTYPING THE NEW PROCESS

The first key in designing and prototyping the new process is to brainstorm design alternatives. Creative yet pragmatic new process designs will result if you are mindful of the process vision, change enabler(s), and knowledge benchmarks. Next you should assess feasibility, risk, and benefit of design alternatives and select the optimal process design. A prototype of the new design is created and refined, followed by the development of a migration strategy to the new design. Finally, the strategy is used to shape and implement new organizational structures and systems.

INCREMENTAL IMPROVEMENT

Process improvement seeks a lower level of change than innovation. If process innovation means performing a work activity in a radically new way, process improvement involves performing the same business process with increased efficiency or effectiveness. To effect an incremental improvement, your processes must be well defined. A well-defined business process benefits a company in three ways: Productivity, process, and people.

Because the performance of a particular enterprise is the sum of all its performance processes, well-defined processes contribute to overall business success. Productivity, process, and people are interdependent and synergistic. As people learn more about and become more proficient in the process, productivity should increase. Whether a function of increased productivity or their own learning and increased skill level (or a combination of these), worker morale will generally increase. Many employees will become more motivated to produce. This circle of productivity, morale, motivation, productivity, etc. is where every organization wants to be. In summary, process improvement is a continuous management process, a journey toward excellence. Below are six general steps needed to improve a business process:

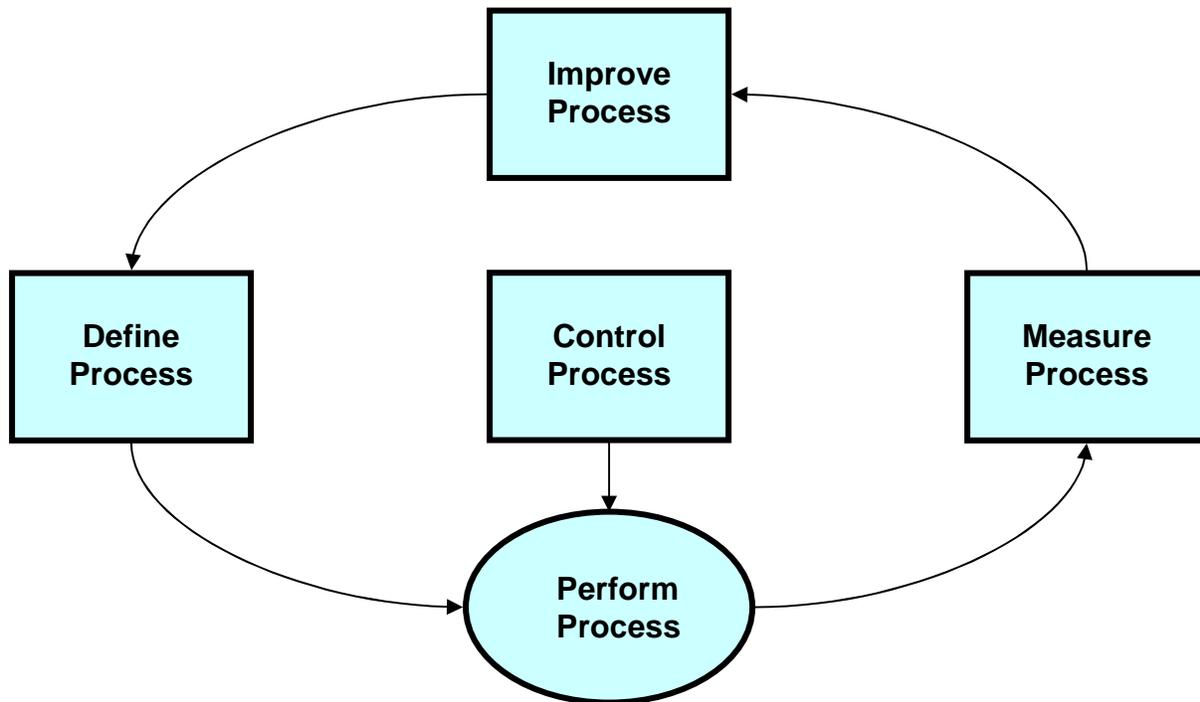


Figure 2 - A Process Improvement Cycle

PROJECT MANAGEMENT

If your organization uses project management methodologies to get work done, you already have excellent tools to manage change when your work meets the definition of a project. Projects, by definition, are temporary endeavors undertaken to create a unique product or service. If your organization hasn't yet committed to creating a common project management framework, then you will have a more difficult time managing change requests. Project management is a very powerful tool that organizations use to manage and control change requests—always part of a project's life. Although change is normal, it can disrupt or significantly damage projects and their budgets if not managed properly. Project methodologies such as the Project Management Institute's Project Management Body of Knowledge have very well-defined processes to manage change. Instituting a project management framework at your organization is a key facilitator of managing change that will provide many other benefits that are worth the investment.

PROJECT MANAGEMENT – INTEGRATED CHANGE CONTROL SYSTEM

An integrated change control system addresses how you can influence the factors that create changes in order to ensure those changes are agreed upon. It also assists by alerting the project team as to when a change occurred or was requested. Finally, the system includes a process to manage changes when and as they occur. To properly control changes, the integrated change control system requires that you maintain the integrity of performance measurement baselines (i.e., schedule, cost, and scope). You must also ensure that changes to the product scope are reflected in the scope's definition. And finally, change must be coordinated across other management processes. For example, a proposed schedule change will often affect cost, scope, risk, quality, and staffing.

The inputs to integrated change control include the project plan, project performance reports, and change requests. Tools and techniques to control change across the project consist of your systems to manage change control, configuration management, performance measurement, additional planning, and the project management information system. The results of your integrated change control processes usually result in project plan updates, corrective actions, and documentation of lessons learned. Diligent and ongoing change control is made much easier if your organization believes in and practices good project management.

TECHNOLOGY STRATEGIES

The second major pressure on organizations today is technology. The technical landscape is in constant flux. Meanwhile, the business is relentlessly moving ahead and demanding better, faster, and cheaper services that are aligned with their objectives. At the same time, the organization's technical architecture puts heavy constraints on what can be changed. Legacy workhorse systems may have done their job well, but they may not play well with

other, especially, newer applications. Further, changes to business processes are very difficult to enact because they require a solid business case, understanding of the impacts, costs, and ROI before a change initiative can be approved. The solution lies as much in the attitudes among IT employees as in good planning, architecture, and business results.

As a manager or developer of a SAS application, you may ask yourself these questions: "How can we govern software engineering better? How can we align the day-to-day activities with the stockholders interests? How can we improve the return to stockholders through software development? How can we report our progress transparently and in a customer-valued manner? How can we continue to build better software, faster and cheaper?" The challenge here is to know how to balance discipline and agility. This is an art because human expectations and external events are uncertain. You must continually assess and proactively gauge your customer's short-term priorities. This kind of knowledge can only be achieved through excellent relationships and regular communication.

CONFIGURATION MANAGEMENT

In 1983, IEEE defined configuration management as a process of identifying and defining the items in a system, controlling the change of these items throughout their lifecycle, recording and reporting the status of items and change requests, and verifying the completeness and correctness of items. Software configuration management is defined as the "management of a software design as it evolves into a product or system". It is also a means of communicating to a project's designers and developers the technical details and events that lead to the eventual build and delivery of the product. Without configuration management, a group will find it difficult to work on applications as a team, recover quickly from errors or bugs, manage maintenance updates, and efficiently test changes to the application.

RAPID APPLICATION DEVELOPMENT

There are many methodologies that speak to rapid application development (RAD) and the discussion of each is not within the scope of this paper. RAD grew directly out of the need to bring software to the marketplace faster and to continually improve application functionality...to respond to change. Regardless of the RAD methodology you prefer, its main focus is quick software development, defect-free.

Along with that focus, you should examine how your team is doing along the way to measure growth and improvement. This begins with examining attitudes about delivering software. You want to build an ecosystem that ships software. The framework of the ecosystem is the methodology that determines who you hire, what you hire them for, how they work together, what they produce, and how they share. It is the combined job descriptions, procedures, and conventions of everyone on your team. Your methodology is the product of your particular ecosystem and is therefore a unique construction of your organization.

In short, a methodology is the conventions that your group agrees to. This methodology should be revisited and improved upon on a continuous basis. Successful methodologies have three characteristics: The project was delivered, the leadership remained intact, and the people on the project would work the same way again. According to Alistair Cockburn in his book, *Agile Software Development*, seven principles are useful in designing and evaluating methodologies: 1) Interactive, face-to-face communication is the cheapest and fastest channel for exchanging information. 2) Excess methodology is costly. 3) Larger teams need heavier methodologies. 4) Greater ceremony is appropriate for projects with greater criticality. 5) Increasing feedback and communication reduces the need for intermediate deliverables. 6) Discipline, skills, and understanding counter process, formality, and documentation. 7) Efficiency is expendable in non-bottleneck activities.

RE-USE

Re-use is absolutely necessary to achieve speed, crucial if you want to keep pace with change. One re-use idea with good ROI is to assemble a library of re-usable objects immediately. Incentives can be given to those who contribute to the library over time. Re-use carries with it a requirement for very generically defined and well-tested chunks of code that can be quickly leveraged during a programming task. Standard autoexecs, utility macros, project folder structures, document templates, and other templates of project artifacts will improve your time to market and facilitate the continuous improvement of your software development best practices. Re-use also reduces the impact of changes to your code base. If a change is needed within a utility macro, you need only modify one piece of code instead of touching every program that uses the utility. The trade off to re-use is the requirement for more training within your team. People must know what re-usable components are in the inventory, how to pull them off the shelf quickly, and how to deploy new and improved components that are fully tested.

INFORMATION ARCHITECTURE

The value of well planned, communicated, and documented information architecture is most apparent when pressures emerge to make changes to the decision support system. An effective architecture will increase the flexibility of the system, facilitate learning, and improve productivity. Your information architecture strategy should include the areas of data architecture (the "what" the decision support system is about), the technical architecture (the processes and tools we apply to the data), and the infrastructure (the platforms that host the data and

processes). The glue, of course, is the metadata catalogue which provides parameters and information about the system, its contents, the source systems, and the data management processes. The information architecture will be impacted by change from new technologies as well as its own success—creating more demand from the business and new data sources.

BEHAVIORAL STRATEGIES

Described below are four aspects of individual and/or collective behavior in organizations. We advocate the examination of these facets, before the design and implementation stages of change.

LEADERSHIP

Leadership is positive influence in action. Much has been written about how to lead change and although quick fixes and step-solutions sell books, we posit that effective change leadership depends upon the kind of change, the levels of change, an organization's culture, the intended result of change, and a host of societal, economic and other 'macro-level' variables. John Kotter, a leading change expert, says that high-level (corporate) transformation efforts fail because eight general steps or phases of change are not given enough time or they are skipped altogether.

1. Establishing enough urgency
2. Forming a powerful, guiding coalition
3. Creating a vision
4. Communicating the vision
5. Empowering others to act on the vision
6. Planning for and creating short-term wins
7. Consolidating improvements; producing more change
8. Institutionalizing new approaches

Researchers like Kotter, Senge, Jim Collins (Good to Great), and others generally agree that successful, internalized change requires 1) servant leadership, 2) the 'right' people, 3) change coalitions and groups throughout the company—not just a change-oriented CEO, and 4) creating wins early on to propel further change. While not within the scope of this paper to adequately address the notion of servant leadership, this kind of leader serves. He or she is not walked over, passive, or presents a false humility. Collins (2001) says this type of leader (he calls Level 5 leadership) is a paradoxical mix of personal humility and professional will...more plough horse than show horse. Senge (1999) says that depicting any CEO as "hero" is a myth and a dangerous one that diminishes the real power of every person in an organization. The servant leader serves the best interests of his constituency: The people who comprise the organization. While shareholder interests are also met or exceeded, the change leader focuses on how to facilitate others for collective success.

CULTURE

Organizational culture has become a business buzzword that risks losing meaning due to its over- and improper use. Culture has been touted as the explanation for business success, failures, and everything in between. But a company's culture, while it encompasses many variables, can be thought of as "the way things are done around here." Implied and very much a part of this colloquial definition are the values, beliefs and attitudes of the people within an organization. These, in significant part, are derived from a company's founder, its history (found in shared stories and myths) its industry, and its country of origin. But cultures are not static. Albeit rather slowly, they can change. New people affect a company's culture; generally, the higher positions have the greatest ability to influence. Even organizations with very low turnover can change their cultures with strategic and concerted efforts and will to do so.

Kotter's (1995) eighth change phase of institutionalizing new approaches (above) includes anchoring the change in the company's culture. "Until new behaviors are rooted in social norms and shared values, they are subject to degradation as soon as the pressure for change is removed," (p. 67). For example, a very centralized, formal and hierarchical organization would reap more change success from highly structured, codified, explicit change processes that are pushed from top down.

TEAMING

As described above, change works best when it is initiated and reinforced by more than one person. Recall Senge (1999) recommends the formation of pilot teams for organizational change.

Whether the change(s) you manage are partially or wholly initiated by you or come from above, deploying several people as a group with the goals of working through the change first, assessing processes and results, recommending modifications, and then championing the change for others is recommended. Even if the change is to occur within a small department and its impact is predicted to be mostly internal, we recommend at least one (preferably more) employee outside your department whose work might be affected—positively or negatively—when

the change is implemented. The point is to involve representatives of potentially affected parties without bureaucratic burdens, time-eating meetings, and unnecessary written reports. The result of both internal and external feedback is higher involvement, interest, feedback and commitment to the change.

MOTIVATION

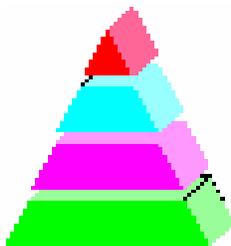
Motivation is a willingness to put forth effort in order to accomplish something. Willingness, while agreed to as a team or larger organization, is personal. Each person must be committed to action that facilitates change. How does a supervisor or any change agent gain and maintain a person’s willingness to change? Below is a basic model that illustrates the ‘steps’ we unconsciously take before we commit our time and energy to something:

Can I do it?	Once I do it, will I perform okay?	Is my performance tied to a reward?	Will the reward be meaningful to me?
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Before we psychologically commit to doing anything, we check in with ourselves about our abilities. If we believe we can do the task, we think about its quality: Will it be good enough (quality could be according to our standards or those of the company)? Then the consequences of performance are considered; if a reward is part of the deal, we consider its meaning or value. The first two steps require that the change agent begins with basic ability questions: Can these employees do what we’re asking them to do at acceptable performance levels? Consider how the change might affect existing resources. Do employees have enough of and the correct tools (hardware, software, other equipment, supplies, budget and people)? Next, think about potential training needs; will the change impose demands for additional training? Once these concerns are satisfied, the third and fourth steps can be addressed.

We’ve all heard the saying, “People only do what they’re rewarded for.” It’s been around for a long time for good reason: It’s almost always true. However, rewarding employees for change performance doesn’t always work because the gift management is willing to give (e.g., dinner certificates, fitness memberships) is not enticing to every employee. Even cash, with its virtual universal lure, will not “do it” for some workers. Some would rather have time off or a subsidized degree. Two important rules for steps three and four: The reward should be immediately given following performance and the reward should be salient to the employee who gets it.

Motivators exist on different levels. Using Maslow’s hierarchy of needs, we can demonstrate how tying employee needs (motivations) to a change situation might apply. Imagine being told that your company was acquiring a small technology company, already famous for its agility and innovation. You head up what would be considered its counterpart, internally. Although no layoffs are announced, you know that redundancy will be a problem. It’s unlikely that everyone in your department will keep their jobs. Corresponding to the need hierarchy, here are some of your employees biggest fears about integration with the new company: (Begin with physical and read upward.)



Self-actualization: *Will it change how I can learn and grow?*

Self-esteem: *Will the change affect the importance of my skills, my value to the firm?*

Social: *Will I be outside of my in-group? Will my role as mentor be taken away?*

Physical: *Will I have a job? What will happen to earnings?*

Although a rather dreary change example, it’s plausible. As the team or department leader, one of your biggest jobs is to find out how individual needs relate to corresponding fears and their opposite, motivators. This framework can be applied to any change example.

MEASURING BUSINESS AND BEHAVIORAL CHANGE

SCORECARDING VS REPORTCARDING

The approach to how metrics are deployed in the organization is important to change on all levels. From the time we were in primary school, through college and beyond, our performance has been measured by the report card. We may have dreaded its arrival, especially if parents took a punitive approach. The report card mentality continues in the workplace today, where the performance appraisal form is dreaded by employee and supervisor, alike. Both report card and performance appraisal are cultural icons of the individual’s worth, but not terribly valid.

While organizational psychologists have known for some time that appraisals only tell part of the story, and are only as valid as their measures' job-relatedness and the diligence of objective documentation, they are relied upon as much for increased motivation as they are for compensation or legal purposes. Although we will not debate the merits of performance appraisals in the motivational arena, we posit that desired motivational effects are not common outcomes for performance management. Moreover, given the need for Sarbanes Oxley and corporate transparency in an era of the disposable workforce, scrutiny and mistrust in the larger organizational context is in vogue.

We contend that while wielding (even the perception of) a stick can motivate people to action—at least temporarily, any negative messages associated with performance appraisals can stifle innovation, risk taking and the business-owner mentality so many companies now seek in recruiting, hiring and retaining employees. We advocate using a scorecard versus a report card to manage outcomes.

A scorecard approach is becoming widely recognized as an effective management tool. A metaphor from the sporting world, a scorecard gives us a notion of competing against ourselves...our level of fitness or skill, which translates well to corporate performance management. But in order for scorecarding to work, your organization must subscribe to the management philosophy of Douglas McGregor's Theory Y, which states that "control and punishment are not the only ways to make people work, man will direct himself if he is committed to the aims of the organization"¹. Although not new, this philosophy of employee commitment is the heart and soul of any change management initiative. Much like a golfer's scorecard, the performance scorecard spurs the employee to exert self direction and control to improve her work. We see extreme benefit to a "change scorecard", so individuals, groups and entire organizations can objectively measure the worth and implementation of change.

The Dance of Change (Senge, 1999) addresses limitations of traditional assessment and measurement in the Western business world. Some of the problems with our typical measurement systems include inherent time delays (the "results gap"), the fact that interim goals and unanticipated accomplishments are not recorded, and the claim that 97% of what matters in organizations cannot be measured.

The biggest obstacle to change in the way we measure people, processes, and change progress is impossible to discern. There are so many! Take for instance our "bottom line" mentality coupled with impatience of stockholders. How much did we win or lose this month? Why didn't we see (revenue, cost-savings, growth) improvement this quarter after we invested so much in the (new system, restructure, quality program)? While we can't change the business world, we can use scorecards; we can also develop new measures of change progress. Consider these: The time it takes to do "x", frustration/confusion levels of team members, customer relations inquiries (content and number), time freed to focus on other value-adding activities. We suggest allowing teams to brainstorm about and agree to the measures they believe would indicate change progress.

BUSINESS, TECHNOLOGY AND PEOPLE CONJOINED

Change is most challenging and holds the greatest risk (and reward) at the juncture of people and business process. We think this bears repeating. At a minimum, we ask you to avoid viewing change as either a human OR a technical issue. While it sounds easy enough, it isn't for any of us. We are socialized to see phenomena in categories, many times as dichotomies (e.g., are you technical or non-technical?) We offer a model to incorporate the various facets of change discussed in this paper. The model can be used to remind us that, for instance, technological change will necessarily involve behavioral considerations like motivations, impact on teams, and leadership of the change. Technological change will also impact and be impacted by more encompassing business processes.

Asking people affected by the change to talk about it, not swallow it whole, will dilute fears, anger and anxiety—should these negative reactions exist. The supervisor or lead who views and treats his people as adults with rights to their own feelings and thoughts will gain more change ground than one who announces the change and insists on immediately 'moving on'. Of course, you should not mollycoddle employees. Once a change decision is made, you must stand behind the change and allow people to go through the process of acceptance. Organizational cultures that promote openness, invite inquiry, and encourage empowerment will generally manage change better; its successful implementation will be faster with fewer complaints. If possible, give employees (think about using pilot teams) latitude to make some decisions about actual implementation, perhaps processes that they fashion. Their ownership and internalization of the change benefit them, you and the organization.

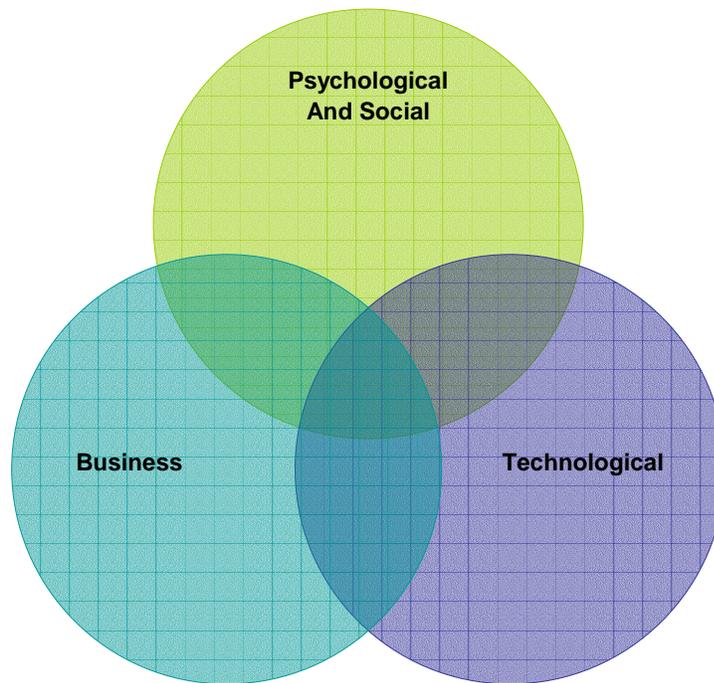


Figure 3 – Major Considerations of Change Management

CONCLUSION

Change in its many forms represents risk to the success of your SAS applications. The management of change must include considering human, business and technological processes. Managing change is not a matter of considering a risk/reward ratio; however the reality is that people's careers depend on their success. Our goal was to look at business, technological and behavioral elements of change and strategies to help manage those changes so that the endeavor of change management becomes less mysterious.

"Change is the only constant" may be trite but it's true. Today's changes in the software development landscape, from off shoring programming talent to migration of production SAS applications to version 9.1, translate as opportunities for you and your organization. But don't forget the sponges.

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