



Using Collaboration to Reduce Time-to-Market in a Software Development Organization

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Abstract

The software development industry is one of the most dynamic, fast-paced industries in the world. New versions of software can be released every six to twelve months. New technology renders existing software systems obsolete overnight. Strategic alliances form and disband rapidly. Technology components are licensed to apparent competitors. A competitor one month is a collaborator the next. Consider the technology startups...Netscape, America OnLine, Iomega, etc. All have experienced rapid growth and success.

This case describes how one software development company utilized teams to reduce its time-to-market for new products. It is the story of an entrepreneurial startup that transformed itself into part of a multi-billion dollar international corporation. It is the story of survival...creating robust, efficient processes to support the company's growth. It was critical to be able to get new products and enhancements to customers. This paper will discuss the transition from a functional organization to a product aligned team-based organization.

Background

The organization was formed in the 1970's by two computer scientists. In the early days of networked computer systems they recognized the need for software to enable different computers to communicate and exchange data with one another. One of their early successes was a product called the Database Gateway. The Database Gateway allowed freestanding and networked (LANs) personal computers to exchange information with mainframe systems.

The success of the product fueled growth in staff and revenues. By 1992, the organization had grown to 80 people and \$12M in sales. But the stresses of this growth surfaced. Product development had become disjointed. Developers were pulled off one product to complete an enhancement for a potential customer at the expense of a product for another customer. Technical support was suffering. Priorities were not well defined.



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To the credit of the founders, they recognized the limits of their managerial and leadership capabilities. They secured additional financing and, later, a new President/CEO for the company. The new CEO was an experienced executive who had managed IBM's European sales organization and Prime Computer's marketing organization. He began to transform the Product Development process as well as the entire company. He recruited a new Vice President for Product Development. A decision was made to reengineer (or engineer for the first time) a world class product development process.

The Change Model

The author was retained to steward and guide the reengineering process. Part of the author's methodology was classical reengineering. Employees mapped core business processes to understand their effectiveness. The other part of the methodology utilized an open systems model (see Figure 1). The open systems model stipulates that the ability of a business process to achieve its goals and respond to the environmental forces acting on an organization (competition, technology changes, customer requirements, etc.) is dependent on the interplay between the technical work process and the organizational systems that sustain it. In order to create an effective system, both the technical work process and the organizational systems must be engineered and jointly optimized.

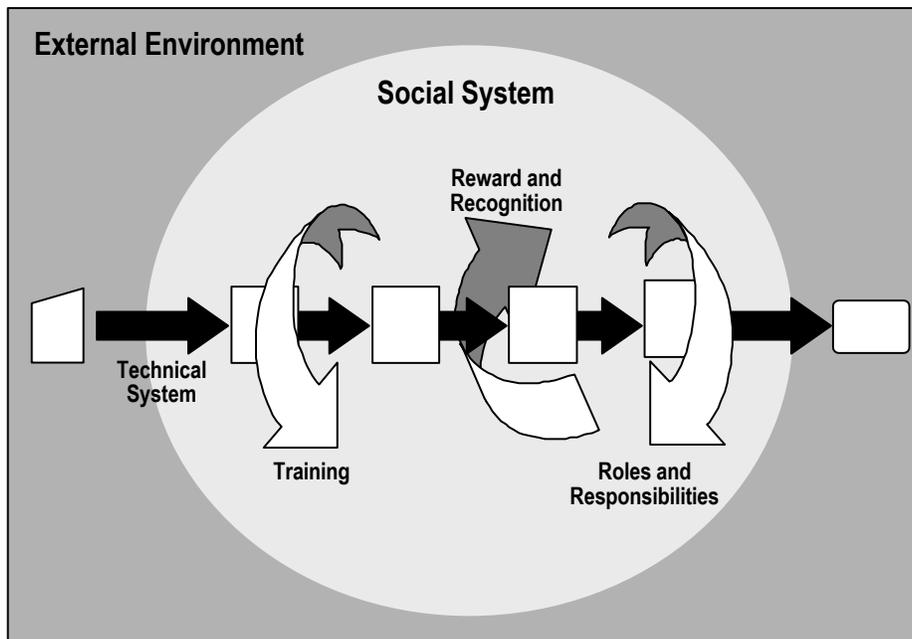


Figure 1: Open Systems Model



This model ensured a focus on the organizational systems and structures to support the business processes and change leadership. Significant changes were expected in the near future, some driven by the leaders themselves and others driven from the external environment. The methodology included components for assessing executive readiness for change, determining strategy, assessing organizational systems, clarifying organizational values, and building commitment for change.

Creating New Business Processes

The first step was the reengineering of core business systems. The author reviewed the methodology and resource requirements with the executive team and the project was initiated. A cross-functional process analysis team (PAT) was established. The team consisted of representatives from all functions and all levels of the organization. The only exception was that no senior management participated on the PAT. Under the guidance of the author, the process analysis team worked full-time for a two week period to analyze the core business process. The overall process flow and variances (disconnects, breakdowns, or delays) in the core process were identified.

In addition to the technical business processes, the organizational systems were analyzed. The PAT analyzed the key organizational systems: training, selection, career development, compensation, etc. The focus of that analysis was to assess how well the organizational systems supported the technical work flow. For example, since the company was highly entrepreneurial, did the selection system ensure that the people with these skills were hired? Secondly, given the highly technical nature of the product and the complex interrelationships among different technologies in the product, did the training system ensure that the technical capability in the organization was maintained?

Lastly the PAT analyzed the decision-making processes and information flows. The PAT identified critical decisions made during the business process. They considered:

- are the right people involved
- is the appropriate information available
- do the interpersonal/social processes support effective decision-making
- how are decisions documented and communicated

- After analyzing the business process from these three perspectives (process flow, organizational systems, and decision-making/information flow), the PAT identified potential changes to the process. The results of the analyses were presented to the senior management team. The results clearly identified the need for significant process redesign, but did not provide detailed recommendations. The senior leadership team commissioned four task groups to further analyze critical sub-processes and “reengineer” (or in most cases engineer for the first time) those processes.

The four sub-processes were:



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- product development
- product installation
- new employee orientation
- training

These four were chosen after discussion among the original PAT team and the senior leadership team. The processes were mission critical and had the greatest impact on the long-term viability of the organization.

Creating An Effective Product Development Process And Organization

In the embryonic years of the company, the product development process was very informal. In fact, there was no formal process. Most of the development efforts were driven by the co-founders unique understanding of the marketplace, their vision of where technology would take the marketplace, and important customers' demands for certain functionalities in the existing software.

There were few standardized development processes. As a small entrepreneurial startup, most work was done through "plain common sense." Highly skilled, talented individuals had been hired. Each possessed and was expected to exercise a high degree of initiative and self-direction. They were given the freedom to plan and execute their work as they saw fit. The small size of the organization facilitated communications. It was easy to keep track of what different people were working on and what needed to be coordinated. In essence they were operating a one large high performing development team.

There were also strong values around customer orientation. Development people would make changes to the software to secure a sale. Sales and development personnel acted very reactively. Often future development projects were put on hold, so that the developers could be reassigned to develop an enhancement to an existing product. This helped develop and maintain a strong, loyal customer base and create a strong positive image in the market place. However, there was no clear product plan for the upcoming year.

The informal, ad hoc nature of product development was appropriate for the company in its startup phase. The product was new with little competition. Delays in new releases or lack of full functionality were tolerated because it was new technology. The company partially compensated for these deficiencies by developing a strong customer technical support staff that assisted customers with workarounds. As other competitors entered the market place, the technology became more of a commodity and product planning become more complicated. The challenge became to decide what new features and functionalities would maintain the products' competitive advantages.

The most important challenge facing the company was the development of an effective product planning and development process. Resources were more limited, the technology more complex and more people were involved. Developers needed a clearer sense of where a product family was headed. Sales representatives needed to be able to explain to customers



what new products would be released when. Customers needed firm dates when they would be able to purchase new products.

The initial process mapping highlighted the breakdowns in the development process. This led to the establishment of the task group to engineer an effective product development process. Like all other task forces, this one was cross-functional. Given the critical nature of this process, in addition to development and marketing managers, both the Vice President of Marketing and Vice President of Development also participated on this task force. The initial analyses in the core process mapping revealed that the flow of information back and forth across this boundary was sorely inadequate. Development could not obtain clear market requirements from Marketing. In the absence of clear requirements, Development began developing their technical requirements and detailed product specifications in a vacuum. There was constant struggle over defining the product features and functionalities. Specifications changed frequently. Miscommunications occurred to the sales representatives and customers. Expectations were created with customers that later had to be met at the expense of future development efforts.

This task force utilized a process similar to the other task forces. They first reviewed the analyses of the original PAT, and mapped the process out in more detail to ensure that all participants had a clear, consistent understanding of what the current process was. The next step included more of a “blank sheet” approach. Assuming that no process existed, they identified the flow of steps for an effective development process. They identified critical steps in the process, important deliverables, and roles and responsibilities.

The task group defined key documents such as Marketing Requirements, Technical Requirements, and Product Specifications. In succeeding level of detail, these documents created a blueprint for the product. A process for developing, approving and distributing those critical blueprints was established. A Product Steering Committee, including the senior leadership of Sales, Marketing and Development, was rechartered. Their role was to formally approve critical decisions in the development process and steward the overall development of each product. Specific roles for Marketing, Sales and Development were defined. An annual product planning process was established. The annual product planning process provided a formal review of all potential product ideas and enhancements. Initial scoping and costing of the effort, market impact, revenue projections, etc. were developed. The product planning process was initiated just prior to the budgeting process (August) and was used to help drive the budgeting process. Over the next several months decisions were made regarding which products would be developed over the next 12 - 18 months in conjunction with the budgeting process. The result was a fixed product plan according to which development resources could be allocated, marketing programs developed and sales plans established.

Throughout the year, adjustments to the product plan could be made. This was one role of the Product Steering Committee. They monitored market conditions, customer requests and development efforts, and adjusted the product plan as needed.



Shifting to Product-Aligned Development Teams

The company had adopted a functional organizational form by default with little deliberate thinking about the most effective structure. Development was comprised of separate Engineering, Quality Assurance and Documentation departments. The development process was sequential with little coordination or planning among the groups. The typical problems with a sequential, development process in a functional organization surfaced: delays when one department “hands-off” the product to another and the resources in the second department are not available, lack of understanding about the product features and architecture, poor coordination across the departments, delays in recycling the product to correct errors, etc.

The Vice President of Development quickly recognized both the process deficiencies as well as the structural deficiencies. She retained the author to identify other organizational forms for the development group. After some diagnostic processes and consultation with the Development Group, the author suggested a horizontal organization with product-aligned development teams.

A design team, consisting of 8 professionals from the development staff was formed. The design team was charged with assessing the merits of a product aligned structure and, if appropriate, designing one for their group. The author provided the design team with information regarding different organization structures and case material regarding product aligned teams. He facilitated a process by which the design team assessed different options for organization structures. The Design Team agreed on a product-aligned structure for the development group and began to flesh out the detailed design.

The detailed design consisted of five (5) product teams. Each team consisted of Development engineers, Quality Assurance testers, and Documentation writers. The design process also identified a need for a new function, Sustaining Engineering. The role of Sustaining Engineering was to fix “bugs” in released software. Any software product will be shipped with some “bugs”, errors in the program that do not become apparent until after it had been installed in a site and run under real world conditions. The complexity of software today precludes 100% reliability testing to ensure that software will work under the many conditions that exist in a data processing environment. The data processing environment is just too complex.

The leadership structure for the different teams was also designed. The Design Team determined that the teams required three distinct leadership roles: project leadership, technical leadership, and administrative leadership. Project leadership consisted of the planning, resourcing, and monitoring of the entire project. Project leaders developed schedules, assigned major tasks to people, and coordinated with other departments. They oversaw the entire development process including code development, testing, documentation, and release. Technical leaders provided direction on the product architecture and code development. Administrative leadership included the handling personnel matters (hiring new employees, hiring contractors/consultants, etc.), budget administration, and training. For most teams, two individuals co-managed the team. A Project Manager assumed the project leadership and administrative leadership roles. The Technical Lead assumed the technical leadership role. For smaller teams, one person assume all three roles and served more as a traditional project



manager. The intent, however, was for the leader(s) to exercise an empowering leadership style and diffuse decision-making to the product team.

With this structure, each product team had all the resources that it needed to develop a product under its direct control. Other advantages of this structure included continuity of staff across the different versions of the product, continuous learning about the product capabilities, more flexible utilization of staff (e.g., documentation helping to write product specifications, developers helping to perform testing, etc.), and greater ownership by team members for product performance.

The continuity of staff was a critical improvement. Under the functional structure, professional staff formed a “pool.” As projects were kicked off, whomever was in the pool and unassigned to a project were assigned to the new project. One person may have written the code for an earlier version. That person generally was not available. Therefore the person assigned to the project had to spend time learning the architecture and studying the coding schemes of the earlier version. This learning curve was one source of delay in the development process. Under the product teams, the same people who wrote the early versions, wrote the subsequent versions. They learned about the deficiencies in the code and developed ways to enhance it. A “learning organization” was created.

One of the product teams wanted to be self-directed. During a restructuring, they were placed under the Vice President of Development’s responsibility. They had operated autonomously and wished to continue doing so. They identified all the roles required on a self-managing team and the processes required. Leadership responsibilities were split among different individuals. Performance expectations were established jointly. They made conscious decisions about how to structure themselves, rather than letting a team design emerge by default. Team designs that emerge by default tend to mirror existing structures rather than represent significant improvements.

In other parts of the organization, changes in the organization structures and job roles were also made. Interfaces between Sales, Marketing and Development were redefined. Development assumed more responsibility for customer interface and determining market requirements. In Technical Support, liaisons with the product development teams were established. A series of ongoing designs and redesigns occurred. The organization structure continued to mature and adapt to the business needs as the company expanded.

As time went on, the interface between Marketing and Development remained problematic. Information still did not flow smoothly across that boundary...information that was critical for establishing product requirements and accelerating the product development cycle time. The organization structure was realigned to shift the Product Marketing Managers into Development. The Product Marketing Managers were responsible for establishing market requirements and providing them to the development team. They were also responsible for managing the life cycle of a product (or product family).

By shifting the Product Marketing Managers into Development, the barrier between Marketing and Development was eliminated. Product Marketing and Development all reported to the same individual. Another design team was established to define the specific roles and responsibilities



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of the Product Marketing Managers and clarify the new reporting relationships. Information began to flow more smoothly between Product Marketing and Development thereby improving the development cycle.

Revitalizing Culture and Values

One of the strengths of the company was a cohesive, high performance culture. In this culture, cooperation and respect for other individuals was strongly valued and reinforced. Customer service and responsiveness was paramount. Individuals sacrificed personal needs to achieve product excellence and customer satisfaction. Product quality and technical excellence were the standards. Professionals would openly and readily engage in technical debates of product architecture and features. Professionals recognized that the purpose of the debate was to create a better product rather than promote one's self interest. When the author conducted an initial assessment he was struck by the extremely high morale and enthusiasm that existed throughout the organization.

The culture supported the team-based approach. However, the rapid growth presented a tremendous challenge to maintaining this culture. Professionals from different companies were hired, each bringing different expectations and experiences. Another significant influence on the culture occurred when the company was acquired by another company. While left an independent business unit, a migration of employees from the parent company began. The normal integration that occurs during an acquisition continued to influence the culture.

As the culture began to fractionate, CEO, the author and the senior leadership team decided that it was time for the organization to redefine the critical values. All employees recognized the power of the original culture. However, they also recognized that some aspects of the old culture were no longer appropriate. An offsite was planned to assess the culture, define what values were important and how to sustain them. A second objective of the offsite was to engage all employees in defining a strategic plan for the business unit. A planning team was formed. Again a cross-functional team was utilized. With the assistance of the author, the planning team structured an agenda and planned all the logistics.

A conscious decision was made to include all company employees in a "large scale/search conference-type" event. Due to a series of logistical and scheduling conflicts, the entire sales force did not participate. In lieu of bringing in over 30 sales representatives and sales engineers from all over the country, the entire sales management team and a sample of sales representatives and sales engineers did participate and represented the sales and field perspective.

The two-day event was held in late January, 1996. Day one focused on the strategic direction for the business unit. Participants identified and discussed trends in the business environment. They discussed emerging shifts in customer requirements and the customer base itself. They identified potential threats from competitors and directions technology was moving. Critical differentiators and core competencies were determined. Day one culminated with participants brainstorming possible strategies for three main areas:

- products and technology



- organizational systems and structures
- relationships with the parent company

A process, devised by the planning team, then distilled all the brainstorm possibilities down to the most viable strategies.

In the evening the executive team took the input from day one and formulated a set of clear, coherent strategies for the three areas. These strategies were presented back to all employees the next day. All participants heartily embraced these strategies. In the traditional strategic planning process, strategies are developed only by the senior leadership team and then are cascaded down to all employees. This strategic planning process was different and precluded that. All employees had been directly involved in the development of the strategies. There was no need to hold additional communications sessions on the strategies or to explain the rationale behind the strategies.

Day two focused on the culture and values of the organization and identifying specific actions to support the culture and values. After agreeing to the business strategies, the core values were identified. The core values were those that formulated the “essence” of the organization, what attracted people to the company and what differentiated the company from other organizations. Participants evaluated the values that existed in the “old company” and identified which values were important to carry forward. They also identified those values that were not longer relevant in the current and future business environment. In essence they created the new set of values to carry forward.

The planning team was emphatic that merely identifying core values was not enough. It was equally important to identify specific actions that should be occurring on a day-to-day basis that would support the core values. Participants spent the next part of the day identifying specific actions that they as individuals and the organization and its leaders could take to sustain the core values. As much emphasis was placed on *personal leadership* and accountability for sustaining the values as shifting that responsibility to the leadership team. Everyone agreed that each person had to do his/her part to sustain the culture.

The last part of day two included identifying what critical actions needed to occur after the conference to execute the strategies and execute the commitments made during the conference. The conference produced both a high level of excitement and enthusiasm among participants, but also heightened expectations for follow through. The comments from participants before, during and after the conference were consistent... “the conference is a great mechanism for addressing the issues at hand, but in order for it to be successful, there must be thorough follow through.”

To follow through with the commitments made, a series of task groups were formed. A total of twenty-two task groups were formed. The task groups included actions like:

- developing a “skunkworks” development process
- developing a rotational assignment and mentoring program
- increasing the involving of employees in corporate task groups
- developing a new employee orientation to infuse the values



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Employees volunteered for the task groups in which they were personally interested. A senior executive was assigned as sponsor for the each task group. Over the next several months, the task groups met to translate the higher-level directions into executable actions. The response to the follow up activity was extremely positive. The groups met regularly and most completed their task. Some were melded with other related task groups, but overall the task groups accomplished what the individuals had committed to.

What We Learned

The shift to product-aligned development teams was far from “textbook.” Although many of the elements are common to different change methodologies, the actual sequencing and execution of the transformation process was very unique. From this unique experience, several learnings emerged.

A rapid prototyping approach to organization design works. The designs created for the different departments were less than perfect. However, the business climate, i.e., the need for on-time product delivery and lean staff precluded exhaustive analysis and design work. All parties recognized that the designs were not ideal. This viewpoint is consistent with the rapid prototyping approach to product development. “Let’s get a workable prototype into the hands of the customer, and let them play with it and refine it.”

This also occurred with the organization designs. After implementation of the designs, employees and managers continued refine them. For example, in the original design of the product teams, product marketing managers were not part of the product team. The information flow between marketing and development remained problematic and eventually the product managers were integrated into the product teams. Similarly, the technical support area utilized a participative design methodology to establish more cohesive support teams. Participative design is a quick, high involvement approach in which employees directly determine their structure. Once the original design was implemented, it continued to evolve. Such ongoing redesign processes create fluid, flexible structures that can more readily adapt to changing business conditions.

Process and structure are linked closer than most people acknowledge. A discussion about structure cannot occur without reference to the process and vice versa. As the organization changes its process the impact on structure is immediate and direct. Process reengineering produces changes in roles, responsibilities and job tasks. The shift to product business teams was a direct result of the process reengineering work. As the product teams were implemented, the teams carefully scrutinized the processes for designing and approving projects.

Where you draw the boundaries is critical. The core process mapping identified hundreds of variances. When examining the causes of the variances, the team recognized that most occur at the departmental boundaries. Information did not get transmitted, the information was untimely, signoffs were delayed, needed staff was withheld by another department, etc. The Vice President of Development remarked “one of the greatest learnings for me was the impact of where you define the boundaries.” The nefarious “lack of communications” can be traced



back directly to boundary definition, not to the traditional scapegoats, individual performance or process deficiencies.

Results

The shift to product-aligned teams and realigning the culture with these teams created dramatic results. Product teams began releasing more products on-time. Productivity increased. Some of the programmers noted that they were “developing product with five programmers that IBM would have required fifty.” The company received ISO-certification in a lightning fast six month period, thereby giving them continued competitive advantage. The product plan gave Marketing reliable dates for product release that they could communicate to current customers and new prospects. Development teams had a clear sense of priorities which to guide their work. Technical Support had target dates for when to begin training support personnel on new products. As a result, when customers called in with problems with new products, they received fast, efficient service.

Summary

The case presented above described a dramatic transformation. The company expanded from \$12M in 1992 with 80 employees to \$80M in 1996 with 400 employees. It became the most profitable business unit in the parent company. A high performance, high involvement culture was retained in a different form than the original startup culture. Significant organizational changes occurred while the company continued to operate with lean staffing and extraordinary product development demands. The discontinuous nature of the change process seemed chaotic, but it matched the organization’s culture and the environment in which it operated. Additional transitions have occurred. But the organization continues to adapt and transform itself.

Solutions Overview

Solutions is a management consulting firm specializing in meeting the needs of companies to improve operational performance. Drawing on a broad base of experience, Solutions consultants work with a client's management team to achieve major improvements in competitiveness, profitability, customer satisfaction, and growth. Applying analytic tools, state-of-the-art technologies, high involvement methods and best practices, Solutions helps clients develop strategies to surpass their business goals and transform their business enterprise.

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