

# **Project Management Skunkworks: Breaking the Rules**

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## **Abstract**

Three new product development programs (PDP) attempting to meet challenging time to market, as well as quality and cost, targets were in urgent need of space and facilities. A decision was made to reengineer a light commercial building 40 miles distant from the main R&D and manufacturing facility. The satellite facility, which currently housed a supplier of electroformed parts to another OEM manufacturing operation, would need to be entirely retrofitted to accommodate the R&D and manufacturing requirements of all four groups. The existing Facilities Engineering Group within the corporate structure was unable to deliver the array of requests generated by the PDPs. This included 31 different subprojects ranging from clean rooms to conference space. A skunkworks project management team was spun off with the directive to meet customer requirements on time and within budget even if it meant breaking rules. The skunkworks project team was able to deliver the projects on time and within budget by adhering to a clear focus on their mission, by extensive up-front planning efforts, by critically analyzing customer needs, leveraging project overlaps, early supplier involvement, team empowerment, and breaking rules.

**Keywords:** Project management, skunkworks, time-to-market

## **Introduction**

Competition for new products continues to escalate in the global marketplace. Leading firms recognize that rapid product development can be a source of competitive advantage in this game. Yet their existing management practices often are not well suited to developing products quickly. Bureaucratic tendencies tend to restrain time-to-market initiatives as disparate functions need to be integrated and the process moves from the chaos of invention to the more disciplined function of manufacturing. Being first to market with a new product yields a number of benefits for the firm. If a product is introduced sooner, the product's sales life is often extended. Earlier introduction usually results in increased market share. Increased sales volume often moves the firm further down the experience curve ahead of the competition resulting in a continuing cost advantage, which can be converted to higher profits. Often higher profit margins accrue to the firm whose product is first to market. Finally, first-to-market firms gain a reputation for innovative products that further add to the bottom line.

Rapid product development to hit narrow marketing windows requires a number of ingredients. Concurrent engineering, CAD-CAM, top management support, rapid prototyping, a focused product

concept, competent and motivated workers, etc. comprise a few of the many factors. Often overlooked in the list of critical ingredients is the availability of appropriate product development and manufacturing space and equipment. If these are not available, provision of this support infrastructure becomes a critical factor in the time-to-market equation.

A large S&P 500 manufacturing firm was faced with bringing three new products to market to meet challenging marketing windows. Time-to-market was of essence in developing the products and gearing up for manufacturing. Space, equipment, and testing laboratories needs were expanding beyond the resource capabilities of the firm at its main site and additional resources were in desperate need. A skunkworks project team evolved with the opportunity to approach a facilities build project from the perspective of its position within product time-to-market initiatives. Since the construction of facilities within large organizations is typically viewed as a burden, or a non-value added expense, it is usually not sufficiently factored into the overall product development process. Constructing a room for a process, or a building for production, remains a critical step, and often an expensive one, in meeting product quality, cost, and delivery projections for new and existing products.

The facilities project examined herein was not initially intended to be a single project with an order of magnitude totaling \$4 million. However, coordination of the individual events that comprised the satellite site renovations created a need to meet tight timelines, and as a result, stimulated the creation of new processes and tools to meet the time-to-market demands. As a result of new approaches and in some cases breaking rules, \$4 million worth of construction projects were completed on time and within budget.

This paper will describe the events that led to the successful delivery of 31 separate but related capital construction projects totaling \$4 million. The completion of these initiatives were accomplished without interrupting existing operations, by introducing changes to existing protocols to forge a new project management process, and meeting or exceeding corporate industry standards. Successes that contributed to getting the work accomplished were identified via interviews with key personnel. The events that led to these successes will be analyzed, and suggestions will be made to transfer this knowledge to other facility build processes within the corporation.

## **Problem**

An existing satellite facility needed to be renovated to house the r&d and manufacturing requirements for three new product development programs (PDP). A complicating factor was that part of the facility currently housed an existing supplier of OEM parts for another major corporation. This existing operation would need to continue uninterrupted during the renovation.

Specific timing of the transfer of the new endeavors to this satellite site was uncoordinated and unplanned. Space at the facility for research sites, pilot programs, and production facilities was at a premium and on a first-come, first-served basis. Within a six-week period, requests from the three PDPs had accumulated totaling 31 separate, albeit related, renovation or expansion projects. Many of the processes to be transferred were not only technologically related, but from a facilities construction

vantage, and a resource management standpoint, they were critically related. Careful coordination of materials and manpower was necessary not to duplicate efforts and waste a substantial amount of time and money. Each program had separate time-to-market responsibilities, and critical market window opportunities, therefore the scramble for space and facilities was on. Forty miles and a county line separated the traditional Facilities Engineering Group, which usually managed capital building projects, from the new satellite facility. The facilities engineering organization based its project management on a 'work order system.' Because of their current workload, the distance of the satellite facility, and the area somewhat characterized by chaos, they declined to manage the project within their organization. Their lack of participation provided an environment ripe for the development of a skunkworks approach.

### **Skunkworks and Rule Breaking**

Recently, a number of writings have emerged in the literature advocating the "breaking of rules" (see, for example, Kennedy and DeGarmo (1997); Buckingham and Coffman (1999)). The idea is that rules exist to be broken. There is a need to break out of the box of convention and experiment with radical and nontraditional ways of getting work accomplished. Too often we get wedded to procedures and practices and lose the focus on the goal. This is supported by the culture of an organization which comprise the values and beliefs shared by employees and then are transmitted from one generation of employee to the next. These norms reinforce the way an organization operates and makes it difficult to change directions and adopt new ways of doing things.

Skunkworks have emerged from time to time in a number of companies to create successful innovations. The skunkworks approach generally eliminates bureaucracy, instills high group identity, permits unfettered communication, creates high motivation, and has a loose structure (Quinn (1996); Tushman and O'Reilly (1999)). The notion is that the major efforts of the project should be specified by the team rather than some bureaucratic procedures or set standards. This often involves the breaking of rules in the process. The team usually has control over the resources and decisions needed to accomplish the mission. The team does have some overall budget and performance expectations, but has minimal interference from upper management. These teams are usually co-located for ease of communication and interaction. Team members are usually hand-picked by the team leader and bond together in a common cause. Thus with its own budget and resources and control over its procedures and process, the team can determine its own course and not be bound by existing procedures and practices(Clark and Wheelwright(1993)). The situation facing the skunkworks project team was ripe to exploit these opportunities.

### **The Project**

The accommodation of so many expansion plans at the satellite facility required an assessment of overall scope. Some of the project scope included space for new and relocated processes, building a clean room and laboratories, a central HVAC plant, installing major air handling systems, develop swing space, build offices, conference rooms and rest rooms. When the Facilities Engineering Group concluded that managing this area over a county line was beyond their jurisdiction, a veteran engineer

who was on transfer assignment assumed the role of project manager. It was the project manager's responsibility to transfer corporate work standards (like scope description, written strategy, quotations, purchase orders, asset capitalization, data files, design drawings, safety awareness, and financial accountability) and associated process controls to a previously unmanaged area. It was during the first six weeks of this assignment and scope assessment that the relation of the individual projects to each other was assessed by the project manager. From the information gathered, a process map (master plan) was created which served as the "blue-print guide" for the next year of activities.

The project manager understood that strategy and cost were directly related, so the initial strategy phase required careful planning "to get it right the first time." During the initial weeks of the strategy phase, for what had evolved into 31 distinct projects, the project manager concentrated on gathering and documenting information. Customer requirements were sought directly from the customers (the three PDP managers and the existing OEM organization). It became clear that many of the needs not only overlapped, but affected each other. For example, for efficiency sake the butted silicon process requires location next to the dicing process, therefore the analytical lab and the PET/FA labs were relocated. Because manufacturing process designs and customer input are dynamic, facility specifications were written and re-written as needed. Since customer requirements drove the project time lines, customers were integral to the information loop. The project manager gave control of the schedule back to the customers by also assisting them with their project management. This stands in contrast to historic construction project methodology, whereby the work order "system" superseded the voice of the customer.

The work-order system is a linear, structured, phased-approach to delivering a project. Work-order protocol typically assigns each project received on a first-come, first-served basis, with little regard to possible intricate relationships between the processes involved. These projects would typically be broken into tasks and disseminated to available design, engineering, and construction staff who might have neither knowledge of others involved, nor a concept of the larger project picture. The completion of the project then, would hinge on a linear pass-off, through a "phase approach" of each individual task. Breaking down deliverables into isolated elements often leads to the duplication of materials, personnel, and resources. This lack of overall vision can account for numerous delays, re-work and cost overruns. Such a rule-based operating structure does not lend itself to accomplishing complex set of interrelated tasks in a short time frame. Unyielding adherence to this system could inadvertently contribute to time-to-market set backs in this facility build project. It was believed that the work-order system, if applied to this large, complex project would have resulted in overall time-to-market failures.

The strategy phase includes writing Scheduled Area Requirements for separate but related projects and requires a deep understanding of not only the processes that were being transferred to the satellite, but of the resources (materials and people) required to put those processes in place. One of many challenges in the strategy process was getting the customer to understand and verbalize their own needs. At times this required substantial education of the customer because they might be unaware of the complexity of their request, as well as the implications of cost, quality and schedule. For example, a customer's requested a facility requirement for their process to be a "Class 100" micro-electronic clean

room—notably an elaborate and costly request. By cascading facility design knowledge to the customer on the technical:cost ratio of their request early in the strategy phase, a more functional output capturing the customer’s actual intent to make the facility ‘somewhat clean’ became an option. For the skunkworks project team, this represents a much different design specification as well as a drastic decrease in cost.

While processes and associated specification needs were being captured and written, human resources were aligned by the project manager to best meet those needs. Resident facility engineers, design firms, contractors, and other vendors were solicited for individual sub-project teams, based on established convergence qualification methods associated with the supplier’s level of task expertise. Convergence is measured by the degree of sameness of facilities, processes, systems, equipment, and human resource management. The goal is to drive to the absolute highest level of convergence possible as determined by business criteria such as cost, timing, and technology capabilities. By applying convergence at the outset, the project manager could choose the talent with the best track record in specific areas. For example, firms with prior experience in clean room design, or those with high purity water knowledge, or installing high voltage switchgear, or those with HVAC design were hired. Reaching for convergence in-sourced and out-sourced means agreeing that an assumed base standard of quality is required for compliance with time-to-market initiatives. This method of team formation was quite different from the open bid, contract administration model traditionally followed by the Facilities Engineering Group.

Coordinating the construction assimilation of so many process transfers at one time required an inordinate amount of documentation and paperwork. Even before customer requirements were solidified, or the ink was dry on specifications, permits were being secured from local authorities, Capital/Lease Appropriations Request were written and submitted, and financial control systems were in place to track expenses. Accuracy in estimating costs and establishing budget controls was essential, as was securing seed funding for start-up expenses such as permit fees or long lead capital equipment expenditures. Since bringing the construction process time in line with overall time-to-market expectations, it was critical to conduct these activities concurrently, keeping each day’s progress in lock step with the master plan.

The strategic phase began in February, and by the time construction began in August, several virtual sub-project teams were under coordination by the project manager, quality control processes were in place, and information between project groups flowed freely. Frequent and candid communication was prerequisite to team membership. This often meant that vendors who may be competitors in business found themselves on the same side, asking questions and sharing professional opinions. Face-to-face meetings or cell-phone conferences were conducted around the clock to ensure a constant state of “knowingness” among all parties (particularly regarding enhancements). This also fostered a sense of camaraderie that was necessary to keep the energy high enough for the succeeding months to ensure that all 31 projects were delivered by the end of the year.

## **ANALYSIS of SUCCESSES and FAILURES**

A number of successes and failures were identified relative to the project. To evaluate and analyze the process, interviews were conducted with customers, key members of the overall team and some company engineers. The team was comprised of professionals from the construction field, engineers from design and build firms, subcontractors, company engineers with distinct process knowledge or subject matter expertise, and the project manager.

### Teaming Skills

By far, the most frequent ingredient cited by interviewed team members as the predominate reason for success, was the effective use of cross-functional teams. Cross-functional teams were comprised of members bringing diverse functional talents to a unified task. Team members cited a renewed support from the corporation to the project and to them, which helped define the commitment and determination level of the team. Specific areas of team conduct identified follows.

#### Leveling the playing field

Membership on the team meant an equal contribution status by all players--everyone was working toward the same goal. Active involvement with the up-front planning strategy phase was expected of all team members and professional opinions were sought, shared, and respected. The project manager was cognizant of previously strained working relationships among various functional groups inside and outside the company, and thus required that this team be comprised of key stakeholders in the project. Turf and talent that might naturally be pitted against one another quickly dissipated as members demonstrated a willingness to divest egos and invest their energies - even as competitors. There was a reported "return to professionalism" enjoyed by the team.

#### Empowerment

Interventions by the project manager, who was supported by top management, left the team with more control over their work. This created an empowered work force, as well as returned control of the project to the customer. Respectful involvement of suppliers and vendors resulted in collegial relationships that could be trusted. The ability of the project manager to provide team members adequate resources and then "get out of the way" paved the way for the work to get done. Harnessing the energy of diverse personnel and project teams requires the project manager's commitment and accountability to a common purpose (Tippett and Peters, 1995). Team member's individual freedom meant responding immediately and professionally, as a team, when necessary without significant work delays or work stoppage ensuing. This was not previously possible at Facilities Engineering Group, due to multiple layers of managerial approval.

#### Communication

A trusting atmosphere allowed for a constant flow of information that was critical for making decisions in a timely manner. The project manager encouraged conducting business where business was: on site, in trailer offices, and in restaurants during breakfast lunch or dinner. Cell phones enabled

constant availability so that ideas never waited for a meeting. This differed greatly from the previous entrenched work-order procedures that required coordinating meetings with many levels of management. Pinto and Pinto (1991) note that individuals communicate more when the physical characteristics of the setting encourage such interaction.

Developing long-term customer-supplier relationships with expectations that they will be effective and adaptable requires an essential culture change with old ways readily discarded (Humenuik and Hamilton, 1994). Traditional customer-supplier relationships have hinged on price. Moving toward a single supplier on the long term relationship of loyalty and trust has demonstrated minimizing total costs.

### Continuous Improvement Strategy

Meetings were held at various stages to answer the question, "What can we do better?" These meetings provided sub-project teams a forum with the project manager to evaluate individual tasks. Peer Review sessions brought all sub-teams together where they applied their individual trial and error efforts to improve collective team performance. Discoveries of how processes could be performed better were immediately implemented into subsequent phases of the project. Interviewees commented that this process of group-discovery was enlightening because they could collaborate with peers and learn how different groups functioned.

### Engage a Project Manager

Two frequently offered reasons for the successful completion of so much work in record time were 1) the existence of a project manager, and 2) the ability of the team members to concentrate on their work. The amount of strategic work accomplished from February to August, and then construction work from August to December, required a constant orchestration of events, resources, and people. An effort of this substance owes tribute to a project leader willing to assume the risk of the challenge. The role of project manager was crucial to the successful delivery of the master plan for many reasons. Such a "band leader" or conductor role has been described as best filled by a connected individualist. These individuals are "...team players with strong egos, who willingly share plans, goals, and glory, incorporating multiple approaches and multiple ideas" (Leavitt and Lipman-Blumen, 1995).

The project manager's daily responsibilities included preventing or dealing with obstacles that cause delays. The project manager, a twenty-five year veteran, was well informed of the organizational dynamics within the company with which he had to engage and disengage. His tending to the hierarchical administrative processes required of a large organization enabled the technical teams to perform unencumbered, and allowed creative control over their own process work flows. When team members were free of energies usually associated with putting out fires, they became increasingly more efficient at accomplishing their goal.

### New Work Practices

The project hurdled numerous bureaucratic obstacles revolving around the behemoth requisition process or reporting paperwork infra-structure. The following work practices were developed on-the-job and now serve as opportunities for new facility build projects:

Enable early project strategies by securing seed-funding up-front for processing fees such as local building permits, preliminary engineering, long lead equipment orders, or other predictable costs such as preliminary design cost, schedule development, and constructability costs.

Assume responsible fiduciary accountability for project cash flows and develop financial controls for accurate reporting to and from the finance office. This provides accounting departments, and the customer, with a daily status of project funds.

Assume responsible management of project funds for tighter control when accommodating weekly, or sometimes daily, customer enhancements. This allows for quick response to customer demands when their time-to-market deadlines shortened--which at times drastically alters construction schedules.

Step-up the approval process by literally walking 80% of the paperwork through the appropriate channels until all required signatures were secure. This practice avoids delays associated with corporate mails systems or administrative personnel.

### Customer as Lead

When asked about reasons for their satisfaction with overall project management, two recurrent messages from interviewed team members were the inclusion of the customer (PDP), early in the project strategy phase, and keeping the customer on board throughout the duration of the work. With the customer taking a lead role and remaining committed to hammering out enhancements with the project manager, it eliminated confusion and the element of surprise. The three PDP leaders became aware of each other's project needs, as well as the effect of their requirements on each other's goals. With a continued striving for group concurrence, the comprehensive master plan remained in tact. The return of the customer as lead voice also shifted accountability and control back into the customer hands, thereby freeing others to focus on accomplishing their individual objectives. This stands in contrast to past practices within the linear perspective of the work-order process where the customer typically "handed-off" his/her requirements, remained outside the design and construction information loop, and later hoped for compliance. In that model, the work order system assumed the voice of the customer.

### Customer Education

Although the customer was kept in the loop, and informed of specs, design changes that affect cost overruns, scheduling, and time-to-market deadlines, it was discovered during the commissioning process that he/she may not always be 100% satisfied. After several discussions during milestone debriefings, feedback meetings, and the peer review process, it was learned that sometimes a

customer's real needs, versus the team's perception of their communicated needs, were not fully explained.

A telling example of this became apparent in the installation of expensive HVAC (heating, ventilation, and air conditioning) units in a micro-electronic clean room. It was clearly communicated by the customer, and understood by the engineers, the suppliers of the equipment, and the installation team that the clean room conditions demanded a constantly renewed pure air source of precisely 67°, plus or minus 1° Fahrenheit. HVAC systems were installed that would not only control air flow, but also condition the temperature of the air to meet the specification of +/- 1° variance given any temperature outside the building: from a 100°F summer day to a -20°F winter day. This was an expensive proposition. It was later learned that the tight variance of temperature was required only within the specific parameters of the new process being used—under the hood in one area of the room. In hindsight, more rigorous education of the customer regarding the particulars of this installation would have made a tremendous difference in the engineering required, and the equipment purchased.

Addressing customer satisfaction in the engineering process remains a dilemma when the question surfaces, “do we deliver what's promised, or what the customer wants?” Vehicles for better communication between the customer and the design team are needed.

## **Conclusions**

During a time when an intense focus on new product development couldn't be greater, it is the companies who respond with innovative products in a timely manner who will win the race. “Doing more with less, faster” has become a byword. Longer sales life, greater market share, lower manufacturing costs, higher profit margins, and enhanced reputation all depend on successful time-to-market initiatives. Being late to the market can result in mediocre results and even losses (Smith and Reinertsen, 1995). The experiences at the satellite facility have demonstrated that a “skunkworks” approach effectively utilizes resources by orchestrating the activities and relationships in a more efficient, timely manner.

The completion of these initiatives met the following objectives: 1) delivered multiple related projects in a coordinated sequence that maximized the materials and person power costs, 2) met new product time-to-market initiatives deadlines by constructing production facilities within a record-breaking time frame, 3) did not interrupt existing operations, 4) met or exceeded corporate industrial standards, and 5) created an infrastructure for future project management procedures. Typically apparent to the success of a multi-phase construction project bearing the additional constraints of maintaining existing operations is a) strong project manager who renders timely decision making, and, b) contract documents that guide change orders (Krivek, Lo, and Hadavi, 1996). Employing a skunkworks approach to this facility build project, however, allowed a breaking of the strict contractual adherence used by the Facilities Engineer Group, and hence a more successful time-to-market delivery.

The lessons learned from project have further reaching cost implications than may be readily apparent. In the life cycle of a product, the creation of space for development or manufacturing remains

to most, a mere blip on the graph. When placed in perspective of the impact that the plant build process has on the total time-to-market schedules proposed for new product entry, the time allotted construction needs to be factored into the equation as a critical event.

For a firm seeking to improve its development capability, no task seems more challenging than learning from individual development projects. Since the dominant organizational structure in most firms is functional, it is within those functions that firms typically seek to capture and share learning. Even without explicit directives from management, individual know-how will increase.

The transfer of know-how within groups, however, deserves scrutiny because it is only through imparting “lessons learned” that group know-how can be capitalized by shortening future project development cycles. Organizations learn only through individuals who learn, particularly those in the position to continually capture customer feedback. In this facility build project the traditional work-order system did not support the flexibility required to meet critical deadlines. Abandoning low efficiency processes and creating new ones built a knowledge base that needs to be made available to the rest of the corporation.

Communicating the process knowledge gleaned from project management at the satellite facility raises the issue of intra-firm technology transfer (across different divisions of the same firm). Exchanging ideas, therefore, supports organizational learning in the interests of achieving goals and reducing total project delivery cycle time (Tidd, Bessant, and Pavitt, 1997).

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