
Management of Small Projects: Streetfighting in the NASA System

by William J. Huffstetler

The NASA management system, as it has evolved over the past three decades, is characterized by larger projects. Ambitious plans, bold directives, massive budgets, and tens of thousands of workers characterize the most spectacular achievements of NASA, yet all during the huge Apollo and Shuttle programs, NASA was involved in hundreds of smaller projects, some of them totally unrelated to their much bigger contemporaries, serving the needs and aspirations of American and international science and technology.

NASA counts some 20,000 "spinoffs" or technologies twice used, about half of them related to medical science. Many of these spinoffs are the direct result of NASA's smaller projects. NASA is one agency whose parts are greater than the whole, whose sum yield is higher than the total of projects.

What is a "small project" at NASA? It is defined as any project not supported by a large pipeline of dollars from a major program or project. It can be a minuscule, stand-alone part of a major program, but it usually has a short life cycle, perhaps 18 to 36 months. While it may have a lower priority in a NASA Center's goals or objectives, a small project is not considered extra, optional, or expendable — it is considered a mandatory activity.

Murphy's Laws enable us to understand the real beauty of a small NASA project. The shorter life cycle of a small project goes a long way in protecting us from Murphy's Fourteenth Law: If you fool around with a thing for very long, you will really screw it up. Most

of all, a small NASA project provides two immeasurable benefits not ordinarily found in mega-projects: considerable "hands-on," in-house activities, and a marvelous opportunity to have some fun. But to manage a small project at NASA you need to know something about the art of streetfighting.

Like a Real Business

Managing small projects is the closest thing to running a true business you can find inside NASA, or within the government for that matter. Small businesses have to streetfight and most new businesses are knocked out in two years or less. Streetfighting techniques can be applied to small government projects as well.

First of all, the first decision for a private business is selection of a product line. NASA does this every day, examining the needs of the nation and the projects to meet various conflicting and shifting priorities, to the satisfaction of Center goals.

Next comes evaluation of competition. True businesses merely have to study other producers in order to begin planning and market strategy, but competition within NASA can come from many sources. Some are internal (such as other funded projects), and some are external (such as user needs). As the new NASA manager on the block begins to streetfight for a project he or she believes in, things get rough. As Murphy notes, friends come and go, but enemies accumulate.

The common next step for private enterprise is conceptualizing, a process that involves both strategy and credibility. In planning, you don't want to eliminate any idea or concept initially — but then, you do not want to plan by committee, either. Near-term action (two to four years) is easy, but long-term strategy (four to eight years) will require phases for major decision points. The idea is to gain credibility for the project by breaking new ground — in small pieces, not big chunks.

The business world next considers risk assessment. For managers of small projects, technical and programmatic risks should be distinguished. I would assume minimum risk technically and maximum risk programmatically. The turtle moves forward only when its neck is sticking out from its protective shell.

Marketing comes next in small business: selling and convincing people of the concept. For small projects, that means internal selling. Establish a visible "golden cookie" for all those from whom you need support. What's in your project for them? How are the organization's aims and aspirations reflected in this small project? Market yourself as a leader — managers are a dime a dozen, but leaders are worth millions. Convince others that you can handle the project, but remember that major conflicts will come from within.

So a continuing process of reinforcement is required to sustain commitments. Murphy warns, however, that if you try to please everybody, nobody will like it. Commit yourself to the project, and convince others. Lead, don't follow, in the marketing of your small project.

Can you deliver the small project on time, on budget, with the people assigned to you? To be sure, take a chapter from the business book and do some "resource projections."

Think twice about assurances of success until you have the people, dollars, and schedule.

You may be asked to do a "cost-to-benefit" study, as commonly practiced in the business world. While some people claim that if government were a business, it would go out of business, others would say that government is there to take risks in order to push technology and expand the frontiers of science. Even if the numbers look bad, lead — don't follow the numbers. Use the numbers, don't be used by them, for strong leadership is mandatory on small projects.

Acquisition and Implementation

So you sold the project. Now what do you do? Acquisition and implementation is the customary final phase of a typical business plan outlined above, but I want to spend some time on this. Most people would think you put all your energy into design, development, test, and certification. That's the easy part of the project.

The hardest part is requirements.

Developing strong yet flexible requirements can make or break a small project. While it is estimated that one hour of planning can save perhaps three or four hours of execution, Murphy adds that anything you try to fix will take longer and cost more than you could imagine. Changes occur at the blink of an eye. They may come from any direction, friend or foe. But the major syndrome, costing valuable time and money, is: "I forgot."

The key to successful acquisition is control, but such control must be self-imposed, and, more important, self-maintained. Let George do it, and George should have your job. Throw out your plans and strategy, and here comes trouble.

Throughout the implementation of a small project (and most large ones as well), the manager discovers the necessity of a continuing process in justifying the project's existence. Here come budget cuts. Can we still proceed?

Here come new priorities. Can we adapt to them? And where did all the project's advocates go? You left it to George, and George left.

At this point you had better control the risks, for, as Murphy observed, the light at the end of the tunnel is actually the headlamp of an oncoming train.

There is no such thing as an optimum organization. There are only good leaders. And then there are managers. Anyone can manage, but few can really lead.

In practical terms for small projects, this means giving maximum authority to project engineering and project managers. It starts with honesty: you do not and cannot know everything about everything. Develop close relationships with subordinates in a spirit of honesty and trust. Be flexible and adjustable, reducing tensions as much as possible. Above all, develop leaders, not merely more managers.

An organization is strengthened when it becomes an organism, when your team numbers know and feel personally responsible for their work. Authority is delegated to the lowest possible level, and commitment to the project rises to the maximum.

Some managers are continually on the lookout for project visibility. If it's visibility you want, have a failure while all else on the flight is nominal. Maximum visibility, however, does not necessarily result from a totally successful flight project; rather, it is provided by project products that fly.

Visibility in an organization is a tricky concept. Support for projects will appear to be totally nil — or you will be helped to death. Visibility is not always desirable for an organization. A genuine leader will recognize others on the team but will not seek personal recognition.

So, Why Manage Small Projects?

You want to manage small projects because the rewards are so great.

On a small project, rewards are more personal than tangible. Success is sweeter for something over which you have major (though never total) control. And the personal relationships, good and bad, built up over the lifetime of a small project will stay with you for the rest of your life.

Those relationships are based upon building leadership through responsibility and authority delegation. The small project is the perfect mechanism for educating younger personnel by integrating them with oldtimers.

With the Apollo-era engineers and technicians retiring at an alarming rate, their wisdom finds no better place to live on than in the hearts and minds of those working so closely together on a small project.

One venerable oldtimer, now officially retired, is Clarence L. "Kelly" Johnson who created his famous "Skunk Works" at Lockheed in 1943.

The "Kelly Johnson factor" is a true educational experience in both learning and teaching, perfectly suited to the management of small projects. Kelly proved that projects led by small committed project teams could be fun as well as challenging, and some of his precepts are paraphrased and outlined on the next page.

Basically, Kelly Johnson pulled a few good people together, gave them authority from beginning to end, and let them tackle tough problems with the simplest of tools and methods. In a mere 43 days, ten dozen people, including 23 engineers, built the first U.S. fight-

er plane to fly faster than 500 mph. With unexpected shared authority, this team focused on a single, clear objective and had enormous fun achieving it. Managers of small projects at NASA would do well to reflect upon what Kelly Johnson learned and taught.

**Kelly Johnson's
SKUNK WORKS: BASIC OPERATING RULES**

1. The manager delegates practically complete control of the program in all aspects; reports go to highest level.
2. The projects office is small, but strong.
3. The number of people having any connection with the project is restricted in an "almost vicious manner."
4. The drawing and drawing release systems are very simple, with great flexibility in making changes.
5. Required reports are at a minimum, but important work must be recorded.
6. Monthly cost reviews cover what has been spent and committed, and projected costs to completion.
7. The contractor must be delegated and must assume more than normal responsibility for good bids on subcontract project work.
8. Existing inspection systems are used, with more basic inspection sent back to subcontractors and vendors. Don't duplicate.
9. The contractor delegates authority to test the final product in flight.
10. Specs applying to hardware must be agreed to in advance of contracting.
11. Funding must be timely.
12. Mutual trust is sustained between project organization and the contractor. Closest cooperation is on a day-to-day basis.
13. Access to the project by outsiders is strictly controlled.
14. Ways must be provided to reward good performance.

— See Chapter 16, "It's No Secret," of Clarence L. "Kelly" Johnson's Kelly: More Than My Share of It All (Washington, D.C.: Smithsonian Press, 1985), reviewed in Issues in NASA Program and Project Management, NASA SP-6101(02).