Solving Business Problems and Shooting Down Enemy Airplanes

Lessons from my Navy Days

Fred Nickols

4/25/2016

DISTANCE CONSULTING

After boot camp, I was trained as an FT – a Fire Control Technician – someone charged with operating, maintaining and repairing complex shipboard weapons systems. For the most part, I worked on Gun Fire Control Systems (GFCS), although I worked on missile systems, too. Both systems can be used to shoot down enemy airplanes. To do so, they solve what is known as "the fire control problem." That process and the process of solving business problems have a great deal in common. This paper makes those commonalities clear.

Introduction

Solving business problems and shooting down enemy airplanes have a lot in common!

Shooting down an enemy airplane is done by a weapons system that solves what is known as "the fire control problem." What I learned about solving the fire control problem while serving in the Navy has been of great value to me in solving the kinds of problems I have encountered in businesses and other organizations during my civilian career as a consultant and executive. The central point I'd like to make in this paper is as follows:

> Most problems encountered in organizations are dynamic. They are, as people so often say, "moving targets." There is not and never can be a static solution to a dynamic problem. The first lesson to be learned from the fire control problem is this: to hit a moving target requires a continuous or "running" solution, one that is regularly updated to reflect the current situation. Dynamic problems are not "defined" and then "solved." Instead, the definition of a dynamic problem evolves over time and its solution must also evolve so as to keep pace. Dynamic problems must be measured and monitored, just as targets are tracked. If you do not approach dynamic problems in this fashion, you will at best solve the problem that *was*, not the problem that *is*.

Solving the Fire Control Problem

I joined the Navy in 1955 and was trained initially as a Fire Control Technician (FT). Missiles were just making their way into the Navy and so the fire to be controlled was, for the most part, that of the guns[1] found on board ship.

The kinds of targets taken under fire included those on land, on sea and in the air. With the exception of stationary targets ashore, the basic problem to be solved is one of hitting a moving target, of putting a projectile or some other explosive device where the target *will* be – and to do that from a platform that is itself in motion. My favorite weapons officer defined my job for me as follows: "When I say 'shoot,' I want the guns to go bang and the bullets to hit the target." The calculations involved in performing this feat constitute what is known as "the fire control problem." The flowchart in Figure 1 on the next page illustrates the basic process of taking a moving target under fire and, if all goes well, of destroying or disabling it.

A guided tour of this process follows.

[1] Known technically as "naval rifles."

Got Targets?

A target might be a convoy, an ammo dump, a bridge, a road, a concentration of enemy troops, an enemy ship, an enemy aircraft or even a missile. Except in actual combat or during training exercises, there are no targets. But, once the fighting starts, numerous targets present themselves.

Prioritize & Select

Owing to the presence of multiple targets offering varying degrees of threat, it is necessary to select the target to be taken under fire. This typically happens as a consequence of prioritizing targets based on the degree of threat they present – to your ship or perhaps to some other ship or assets you are trying to protect. You can't take all targets under fire simultaneously; you have to choose.

Acquire & Track

Once a target is selected or, as they used to say in my time, "designated" (and often by someone who was operating a Target Designation System or TDS), the task at hand is one of acquiring and tracking the designated target. The Gun Fire Control Systems (GFCS) I operated, maintained and repaired had a component that served this tracking purpose: the fire control radar. Once acquired and tracked, a process that involved "gating" and then "locking on" the target, its position and movement could be monitored and tracked. This information was fed to another component of the GFCS, the GFCS computer.

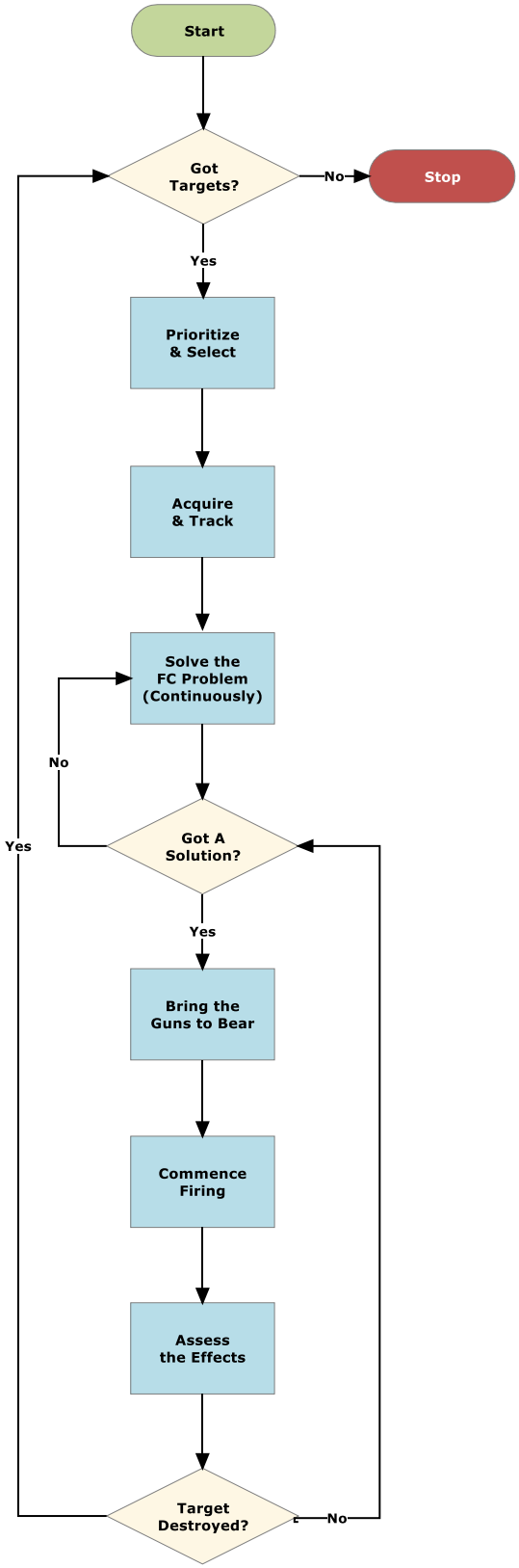

Figure 1 - Solving the Fire Control Problem

Solve the Fire Control Problem

The target is moving, the ship is moving, the deck of the ship is rolling and pitching and, in the case of a piloted aircraft, the pilot doesn't want to be greeted by a projectile and so the target is frequently taking evasive action. Figuring out where the target will be and calculating gun orders such that when the gun is fired the projectile will intercept the target is the job of the GFCS computer. Most important, it maintains a "running solution" (i.e., it solves the fire control problem on a continuous basis). Static solutions won't do. Everything involved is changing continuously and the solution must keep pace. Otherwise, there is no hope of hitting a moving target.

Got A Solution?

Once the solution stabilizes, the gunnery system is ready to do its job.

Bring the Guns to Bear

The gun mounts can be swung out, matched up with the orders being sent from the computer, and the guns can be placed in automatic. Everything is ready.

Commence Firing

Assuming the target being tracked is still the priority and the solution to the fire control problem is being maintained, the guns are loaded and the command to commence fire is issued.

Assess the Effects

Basically, this is a matter of determining if the bullets hit the target or, in the case of projectiles with proximity fuzes, if they came close enough to the target to detonate and do enough damage to make the target no longer of interest. In any event, the effects of firing on the target must be determined.

Target Destroyed?

If it's been destroyed, you can cease firing, look for and take under fire other targets or, if there are no more targets, you can simply cease firing altogether. But, if the target has not been destroyed or sufficiently damaged to render its threat of less consequence than other targets, you will keep firing and that entails ensuring that you still have a solution to the fire control problem. The target might have broken track and you will have to reacquire and track it then solve the fire control problem again (and keep solving it) so as to take the target under fire again.

The Civilian Version: Solving Business Problems

Guess what? Things aren't all that different in the civilian world. There, too, the targets of interest are often moving targets. Change permeates everything. Oddly, many people in the private sector are quick to point to change but few seem to realize the importance of *the rate of change*. No Fire Control Technician (FT) worth his salt would make that mistake. As I was to learn, the process of solving business problems has a lot in common with the process of solving the fire control problem. See the business problem solving version in Figure 2.

Got Problems?

There is no shortage of targets (i.e., problems) in the civilian world. Very little time is spent waiting around for the action to begin. Action is ongoing.

Prioritize & Select

There are always more problems to be solved than there are resources available to devote to solving them. As with targets, problems must be prioritized and then selected. As with targets, the level of threat posed might be one criterion for setting priorities. Return on investment (ROI), that is, the ratio of the payoff of solving the problem against the cost of solving it might be another. Regardless of the criteria used, business problems must be prioritized and selected for resolution. In a word, they must be "targeted."

Define, Measure & Monitor

This is the civilian counterpart or equivalent of "Acquire and Track" with respect to a target and here is where a great many civilian problem-solving efforts go astray. Business problems are rarely defined (i.e., isolated, located and articulated); they are more rarely measured in terms of their costs and the benefits of solving them; and, rarest of all, business problems are hardly ever monitored on an ongoing basis so as to know at all times their status, their costs, the benefits of solving them and the effects actions taken are having on them. Making matters worse, problems are often asserted at the executive level, wrestled with at the middle management level and actually tackled at the line management and workforce level – all with very little two-way communication and even less mutual understanding.

Figure Out What to Do

Just as with the fire control problem, a solution to a business problem must be determined. And, just as with the fire control prob-

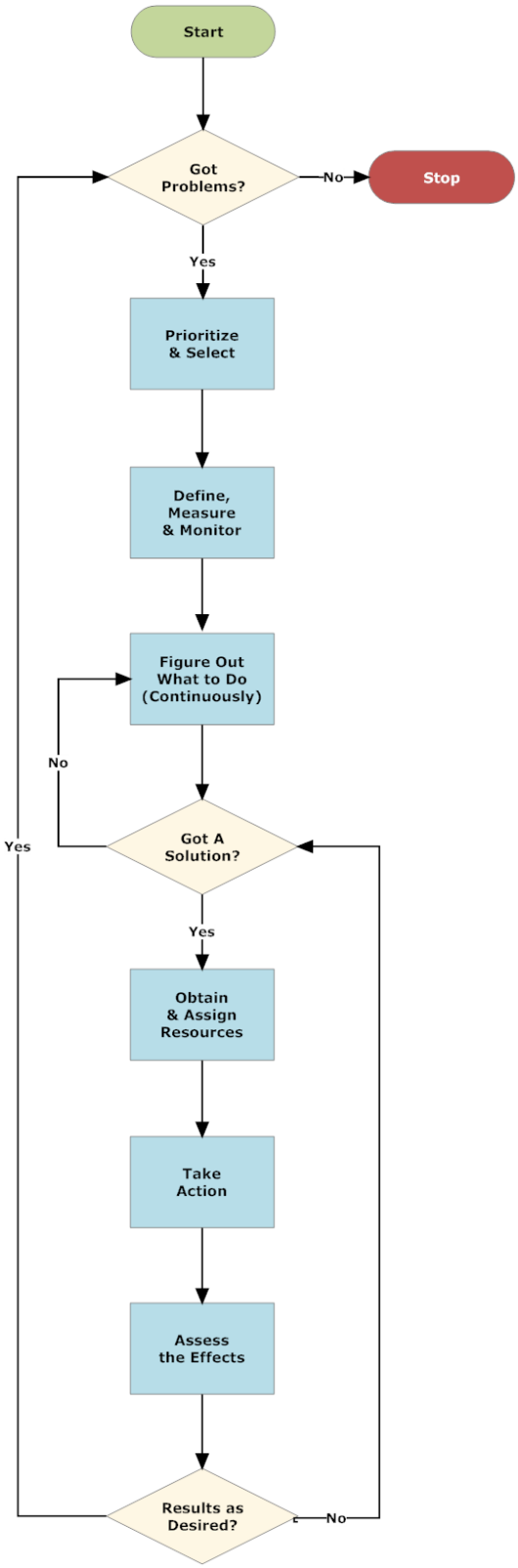

Figure 2 - Solving a Business Problem

lem, the solution must be kept current. Business problems are not fixed, static math problems with fixed, static solutions. When it comes to solving business problems, it is every bit as much a matter of keeping up with the problem as it is a matter of coming up with a solution.

Solving business problems is essentially a matter of crafting an intervention, of changing things in one or more structures so as to have the desired effects as measured somewhere else, often on the bottom line. In a GFCS, the solution is configured by a computer designed and built for that purpose. In a business, solutions are configured by people, and the solutions they configure vary with their skills, experience, biases and the problems themselves. So, if the heart of a gunnery system is the computer, the heart of a business problem-solving system is people. Moreover, instead of solving just one kind of problem, which is all that is expected of a GFCS computer, people must tackle and solve a wide range of problems. They are general problem solvers.

Got a Solution?

In a GFCS, the computer operators can tell if the computer has a solution to the fire control problem. Making that call with respect to business problems isn't nearly as easy. If a solution is an intervention, a course of action intended to bring about certain effects, then it's important to understand just how the planned course of action will indeed produce the desired effects. If the linkages between the course of action you're contemplating and the effects you're seeking aren't clear, you probably don't have a solution.

Obtain & Assign Resources

Just as the gunnery officer on board ship cannot take a target under fire unless and until the ship's guns have been released to his control, it is often the case that managers who are working business problems will require more and different kinds of resources than they ordinarily have under their control. There is, then, a requirement to obtain and assign resources to roles, tasks and responsibilities that must be fulfilled in order to solve the problem at hand. Frequently, this requires making a case for those resources.

Take Action

Taking action in a business setting is not a simple matter of loading and firing the guns (although it often looks that way and "hip-shooters" and "lip-shooters" can be found in just about every organization). The actions necessary to solve important business problems often entail complex, multi-layered courses of actions – interventions that must be orchestrated and coordinated over time (often long periods of time). And, just as is the case with the fire control problem, these solutions, these courses of action, these interventions, must be kept current, which is to say they must be kept aligned with what is an ever-changing problem situation. Too often, I fear, we are guilty of solving the problem that was, not the one that is and certainly not the one that is about to be.

Assess Effects

This should be an easy, almost automatic step but, unfortunately, it isn't. This is because, as noted earlier, we often fail to adequately define, measure and monitor the problems we set out to solve. Were we to do so, noting the effects of our actions would be comparatively simple. Instead, we push measurement and assessment to the back-end of the process and there it languishes for want of interest and resources. Consequently, instead of a steely-eyed assessment of the effects of actions taken, what frequently happens is that those in charge declare victory; they announce that the problem has been solved and all concerned move on to whatever situation is now center stage.

Results as Desired?

As the preceding item suggests, this decision is often made in a *de facto* manner, the consequence of declaring victory. Successes are claimed, failures are buried and the problem is swept under the rug until such time as it resurfaces, often bearing a new label and just as often being made the target of old solutions also bearing new labels. But, if the decision is an honest one, the problem either has been solved (or affected to an extent such it is no longer a priority) or it remains a focal point for action. Again, the importance of maintaining a "running" solution is apparent.

Summary & Conclusions

As I asserted at the beginning of this essay, I am convinced that much of what I know about solving problems I learned as a Fire Control Technician (FT) in the Navy. The lessons I learned go well beyond the Fire Control problem itself. I also learned to troubleshoot complex systems, a form of problem solving known as "fault isolation" and which lies at the heart of the much-vaunted Kepner-Tregoe approach. The two most important lessons I learned are these:

1. problems are dynamic and solutions must be dynamic as well; moreover, solutions must keep pace with the problems they are meant to solve;

2. all problems are embedded in some larger structure and the solution to the problem lies in changing something somewhere in that larger structure.

Can what I learned be passed along to others? I think so. I've tried to do that with many of the articles I've written about problem solving, solving problems and an approach I call "Solution Engineering." I hope others find this essay and my other articles helpful in honing and otherwise improving their own problem solving skills.

Finally, if you'd care to compare the two problem-solving approaches I've just reviewed, a side-by-side presentation of the two flowcharts can be found on the next page.

Related Resources

My articles web site has numerous papers related to solving problems and the "Solution Engineering" approach. All are free and they can be accessed by going to www.skullworks.com and clicking on the link to the Solution Engineering section.

About the Author

Fred Nickols is a writer, consultant, one-time executive and former career Navy man. He served on active duty from 1955-1974 and retired with the rank of Chief Petty Officer. His rating was that of Fire Control Technician (FT). He can be reached by email at fred@nickols.us and interested readers can visit his consulting company's web site at www.nickols.us.

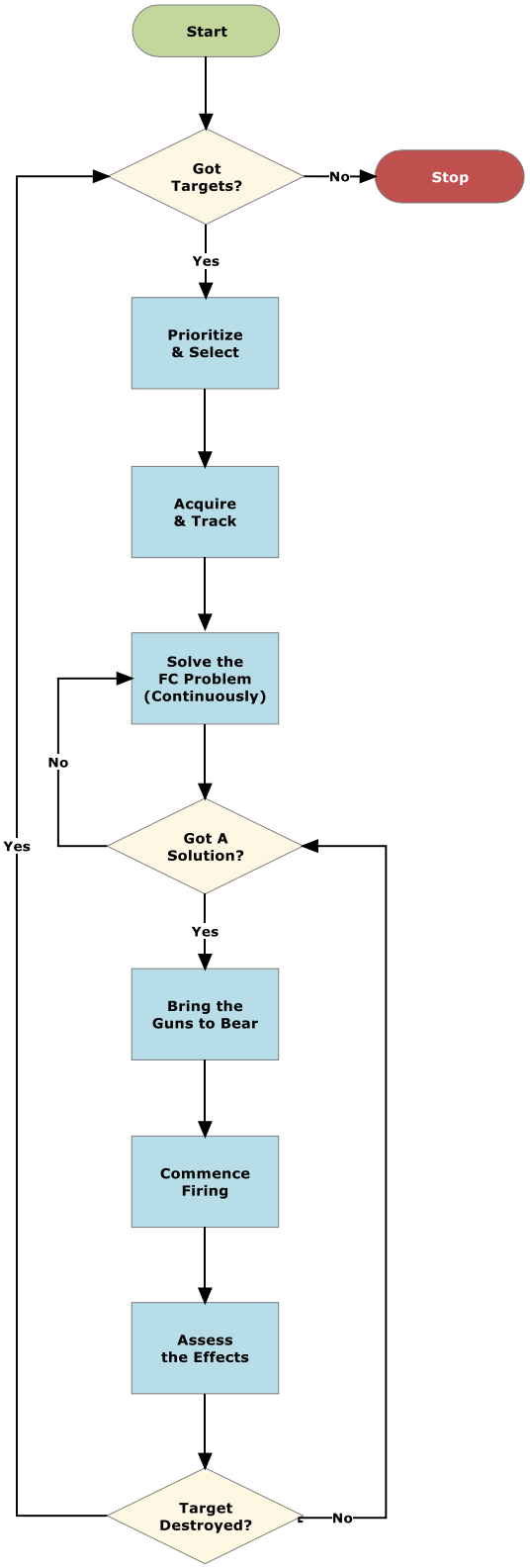

Figure 1: Solving the Fire Control Problem

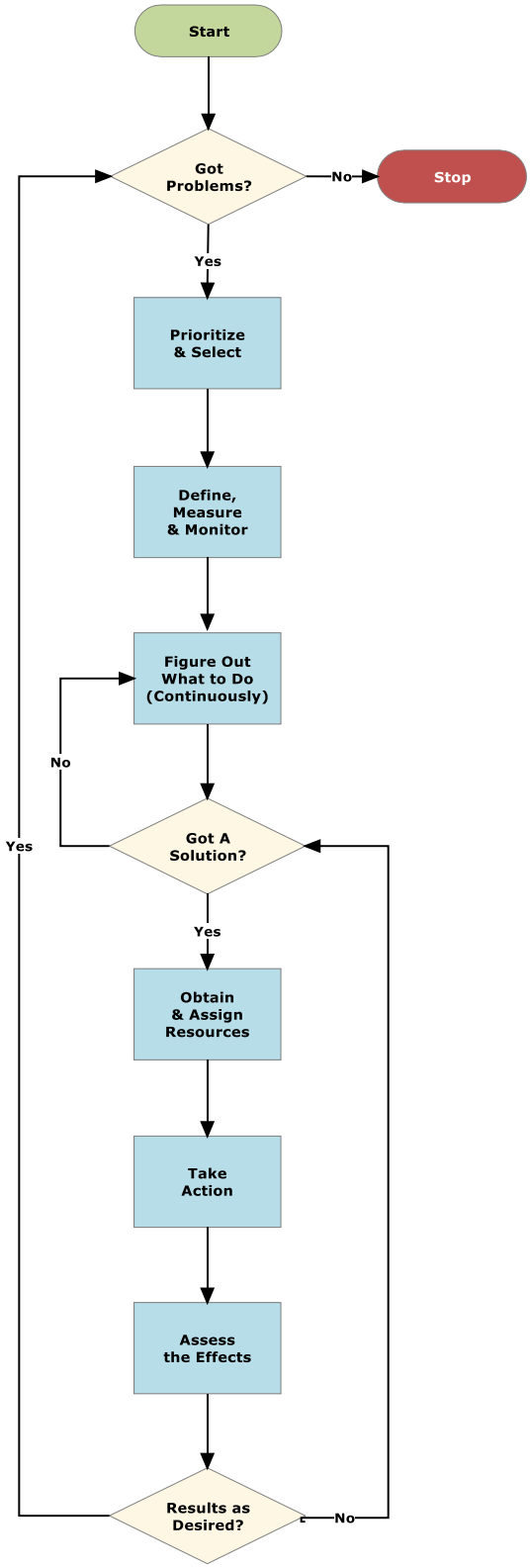

Figure 2: Solving Business Problems