Acquisition Archetypes

Changing Counterproductive Behaviors in Real Acquisitions

Longer Begets Bigger

Background

In 1983 a military helicopter program was started to develop an advanced aircraft for performing armed reconnaissance in all weather conditions. The new helicopter would also incorporate stealth technology.

The acquisition included a nine-year demonstration/validation (DEM/VAL) phase before beginning an engineering and manufacturing development (EMD) phase to build the production helicopters.

Although launched in 1983, the program did not plan to deliver production units until 2006—an expected acquisition and development period of *23 years*.

Budget Cuts, Slow Development

The acquisition approach to the helicopter changed substantially during the long course of the program. Over its lifetime the program was restructured six times due to budget cuts. After one severe reduction a major schedule extension was made to allow development to continue, but at a very low funding level, which further slowed the pace of the development.

A decision was made 15 years into the program to accelerate development of some of the helicopter's critical subsystems, but to do so within the existing funding. This accelerated development required instituting a significant number of new acquisition processes on the contractor team, adding to the program's overall risk.

Manufacture Under Scrutiny

Completion of the long DEM/VAL phase was followed by a successful milestone review of the program's readiness in 2000—and, with it, approval for EMD.

Yet the program came under increasing scrutiny as development continued. This was in part because of its high total cost estimate of $38 billion—$14 billion of which was to be spent between 2004 to 2011, with much of that allocated to manufacturing. An early plan envisaged procurement of 5,023 helicopters. However, the per-unit cost had more than quadrupled since initial development, causing the military to incrementally slash its planned production quantities down to 1,400, then 1,213 and finally to only 650—less than one-eighth of the quantity originally envisioned.

> *"The per-unit cost had more than quadrupled since initial development."*

Cancellation

Ultimately, the program was cancelled in 2004 after 21 years, $8.5 billion dollars spent, the construction of two flying prototypes, and a partially completed test program. The helicopter was still at least two years short of going into full production. The reasons for the program cancellation included the need to invest in renovating the existing fleet of aging helicopters—which had become even more important in light of the past postponements in delivery of the replacement aircraft.

Also, the world situation and intended operational environment for the helicopter had changed substantially since the program's inception. As military threats changed from the Cold War era to counter-terrorism, the corresponding changes that would be needed to make the helicopter survivable would have added several more billion dollars to the total price and affected its stealth performance.

Meanwhile, a new technological alternative, unmanned aerial vehicles (UAVs), was coming into use in the surveillance role at lower cost, at no risk to the warfighter. UAVs had already proven their worth.

(Continued on page 2)

(Continued from page 1)

The Bigger Picture

Establishing a long development period in the initial plans actually contributes directly to expanding costs and schedules—what was expected to take a long time ends up taking even more time. This occurs for two reasons: (1) longer project duration leads to greater project effort, and (2) greater project effort leads to longer project duration.

Longer duration leads to greater effort because of steady environmental changes and ongoing scope creep. Greater project effort leads to longer project duration simply because additional effort requires additional time to execute.

In this dynamic several things can happen. The technology can become obsolete before it is time to field the system (thus forcing a redesign). The user or operational needs may evolve past what the system was designed to do by the time the system is delivered, rendering the delivered product inadequate or irrelevant. (That, in turn, can force either a technology refresh or an entirely new development effort.) This effect is described in *Software Project Duration and Effort: An Empirical Study* [Barry 2002].

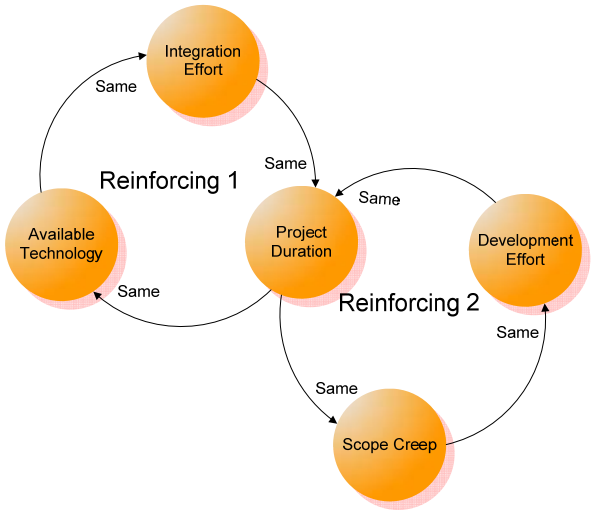
> *"Since the project's customers only have one chance to state their requirements, they are more likely to include every requirement they can think of upfront [Ching 2004]."*

Other factors can influence this dynamic. If an acquisition program is expected to be large, even while still in the initial planning phases, it can affect the way that users behave during requirements elicitation. If stakeholders feel that this program is their only shot at change, they'll load the system up with everything they can think of, because there won't be a second chance.

Breaking The Pattern

Once started, the *Longer Projects Beget Bigger* dynamic is as difficult to stop as it would be to stop the inevitable advance of the technological environment that fuels it. If technology obsolescence becomes the issue and the program proceeds using the planned (older) technology, the result will be an immediate technology refresh, or inadequate technology with expensive maintenance.

A Causal Loop Diagram of the Longer Begets Bigger effect.



System variables (nodes) affect one another (shown by arrows): Same means variables move in the same direction; opposite means the variables move in opposite directions. Balancing loops converge on a stable value; Reinforcing loops are always increasing or always decreasing. Delay denotes actual time delays.

If the problem is the evolving user needs, the choices are no better. Ignoring those user needs may condemn the system to irrelevance or cancellation because it will not be capable of performing the functions the users need, or of doing them well enough—but choosing to change the system at the users' behest may force the system into another cycle of longer duration and greater investment of effort.

Prevention is the most practical strategy for dealing with the projects—avoiding the dynamic in the first place. Doing so involves several considerations—the anticipated duration of the program, the expected rate of evolution of the needed technologies, and the rate of change of the operational environment. Rapid change calls for smaller, distributed programs rather than large, monolithic systems.

Finally, the identification and implementation of acquisition reforms (e.g., competitive prototyping and improving the corps of acquisition professionals) may ameliorate this dynamic.

[Barry 2002] Barry, Evelyn J.; Mukhopadhyay, Tridas; & Slaughter, Sandra A. "Software Project Duration and Effort: An Empirical Study." *Information Technology and Management 3* (2002): 113-136.

[Ching 2004] Ching, Clarke. "The Software Project Manager's Conflict—to allow, or not to allow, change." MBA diss., Open University, April 2004.

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