Case study

Lab realignment

How Applied Materials collapsed four labs into two and hit a $20M-a-year savings target on schedule — without ever stopping the business.

Results series.

A brownfield fab program hiding inside a cost-reduction target: hundreds of truck-sized tools relocated, requalified, and returned to production and customer demos while development never paused.

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Client / program

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Lab Realignment

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Core thesis. The savings were never in doubt on paper. The risk was time. Every quarter the consolidation ran late cost Applied Materials roughly $5M in savings it would never get back. lateralworks structured the program so the schedule itself became the tool that protected the money — built around tools rather than buildings, driven by a single repeatable move template, and refreshed weekly so slips showed up as trends before they became misses.

Overview

Abstract

Applied Materials set out to consolidate its process and demonstration labs from four buildings into two. The prize was a permanent reduction in asset and operating cost worth roughly $20M a year — about $5M every quarter. The obstacle was that the labs could not close. The tools inside them were running customer demonstrations, low-volume production, and active product development, and each one was owned by a product group with its own commitments to protect.

This was not an ordinary cost project. The equipment was the size of a truck, weighed several tons, and ran hazardous gases and chemicals. A single tool took four to five months to move, facilitize, install, and requalify through three tiers of testing. More than sixty of these tools had to move in eighteen months, alongside a substantial facilities retrofit — new gas and chemical distribution, reclaimed cleanroom bays, and an electrical consolidation. Viewed honestly, Applied was decommissioning two fabs and standing two more back up in less space, without stopping the business running inside them.

lateralworks was brought in to make sure the program finished on time, because time was money in the most literal sense. We opened with an assessment, then engaged a strong program manager to build a macro schedule organized around tool types and shared-utility "tool farms" rather than around buildings. From that we developed a single repeatable tool-move template — roughly 150 activities, scrubbed with every function and anchored on the milestones the tool owners cared about. We rolled it across the fleet, then drove the whole program with weekly refresh planning and a financial tracking model that showed savings as a schedule trend.

The program finished on schedule. Applied met its savings targets on time, the business never stopped, and for the first time the technical functions and product groups worked as one team. The move template outlived the program and became the standard way Applied installs and relocates a tool. This paper sets the context, then lays out the problem, the approach, and the financial result.

01

Section 01

Background: the Maydan Technology Center

To understand why this program mattered, it helps to know what sat at the center of it. The destination for the consolidated 300mm fleet — building 85 — is the Maydan Technology Center, Applied Materials' flagship semiconductor research and development fab in Silicon Valley. This was not a warehouse move. It was a reshaping of the physical heart of the company's innovation engine, carried out while that engine kept running.

What Applied Materials does, and why its labs are strategic

Applied Materials is the largest supplier of the equipment, services, and software used to manufacture semiconductors. Nearly every advanced chip in the world is touched by an Applied system somewhere in its production. To develop that equipment — and to prove it to the chipmakers who buy it — Applied runs its own fabs full of production tools. These labs are where new process technology is invented, qualified, and demonstrated to customers before it ever reaches a customer's own fab. They are, in a real sense, the company's product-development floor. Downtime in these labs is not an inconvenience; it is lost roadmap.

The Maydan Technology Center

The Maydan Technology Center is a billion-dollar development facility housing more than 120 advanced process tools and over 80 metrology and inspection tools, where several hundred Applied engineers work alongside customers to bring new semiconductor process technology to life [9][10]. It is both a fab and a test lab: a customer can run every major manufacturing step — deposition, etch, implant, planarization, metrology — under one roof, which is what lets Applied shorten the cycle from a new idea to a qualified, production-ready process. It is widely described as the heart of Applied's innovation engine, and it operates on 300mm wafers, the volume standard for modern logic and memory [9].

The center is named for Dr. Dan Maydan, the engineer who joined Applied in 1980, served as its president from 1994 to 2003, and led the development of the Precision 5000 — a single-wafer processing system the Smithsonian holds in its permanent collection as a technology that shaped the modern world [12]. Naming the building after him is a fair signal of what it represents to the company: not overhead, but the place where Applied's next products are born.

Figure 1. The destination was not a warehouse. Building 85 is the Maydan Technology Center [11] — Applied Materials' billion-dollar, 300mm R&D fab and the hub of its collaboration with customers. Consolidating into it meant rebuilding the company's innovation floor without pausing it. Facility figures per Applied Materials public statements [9][10].

›› **Watch:** Maydan Technology Center overview video — Applied Materials, youtube.com/watch?v=b_PCQAJzHj8 [14]

How the facility shortens the customer's cycle

The reason Applied invests so heavily in these development fabs — the Maydan Technology Center today, and the $4B EPIC center now rising on the same Silicon Valley footprint [13] — is to compress the time a customer needs to get from an idea to a commercial chip. Applied's own model of that journey contrasts the traditional path, where a new process is handed off across separate organizations, with a collaborative, in-facility path where the equipment maker and the chipmaker develop together under one roof, backed by the full suite of Applied's R&D tools. Applied puts the difference at roughly 30% faster to high-volume manufacturing [10]. That is the enduring purpose of the labs this program consolidated, and the reason keeping them running while they moved was non-negotiable.

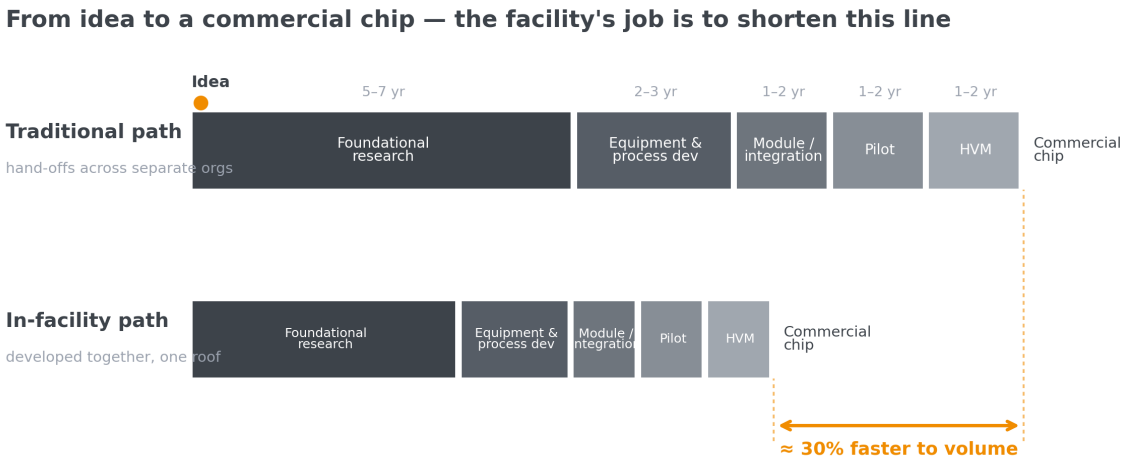

Figure 2. Why the labs matter. Applied's development fabs exist to shorten the customer's path from idea to commercial chip; Applied estimates its collaborative, in-facility model reaches high-volume manufacturing about 30% faster than the traditional hand-off path. Concept and stage figures redrawn in the lateralworks style from Applied Materials' public EPIC briefing [10][13]; original artwork, not a reproduction of Applied's slides.

A note on the public record

The Lab Realignment program itself was an internal operations and cost initiative, and Applied did not publicize it as a standalone project — there is no press release or public success statement to cite for the relocation specifically, which is typical for internal restructuring of this kind. What is public is the strategic weight of the facility at the center of it: a billion-dollar R&D fab that Applied has continued to invest in and expand, most recently through the $4B EPIC collaboration center announced for the same Silicon Valley footprint [13]. That continued investment is the clearest external signal of how much the labs consolidated in this program are worth to the company. The engagement facts that follow are drawn from lateralworks' own program records [6][7].

02

Section 02
The problem

Applied Materials makes the equipment that other companies use to build semiconductors. To develop that equipment and to show it to customers, Applied ran its own labs full of production tools — process tools, demonstration tools, and the metrology and support equipment around them. Over the years that fleet had spread across four buildings. Each building carried its own cleanroom infrastructure, its own gas and chemical systems, its own overhead.

The plan was to pull all of it into two buildings, 85 and 81, retire the tools that were no longer worth keeping, and close the process and demonstration operations in buildings 2 and 3. Do that, and Applied would take out roughly $20M a year in asset and operating cost. On a spreadsheet it was clean. On the floor it was one of the hardest things a semiconductor company can attempt.

The tools could not simply be switched off

Every tool in those labs belonged to a product group, and every product group had commitments. One tool was mid-way through a customer demonstration. Another was running low-volume production for a customer who had no second source. A third sat on the critical path of an active development project. The tools could not be moved on the program's convenience; they could only move inside the narrow windows their owners could afford. And to hit the cost target, Applied also had to cut the tool count outright — a contentious ask of the very people whose cooperation the program depended on. The end-state count alone carried a real gap to close, on the order of sixty-odd tools against a wish list closer to eighty.

Moving a tool is a small construction project

A semiconductor process tool is not furniture. It is the size of a truck, weighs several tons, and is plumbed into hazardous gases, corrosive chemicals, ultrapure water, exhaust, and power. Moving one is a sequence: prefacilitize the new location so the utilities are waiting, decommission and detoxify the tool, rig and transport it, set and reassemble it, then qualify it through three tiers of testing before the owner will accept it back. Start to finish, an average tool took four to five months. Applied had to move more than sixty of them in eighteen.

And it was really a facilities program too

The relocations sat on top of a substantial facilities retrofit. Building 85 needed general infrastructure built out and a CVD farm fitted up. Building 2's cleanroom bays had to be reclaimed and refitted for lithography. There were wet-lab fitups, "first-use" tool bays, a phase-two electrical consolidation, and rearrangements in building 81 — each one carrying its own contractors, permits, and city inspections. Layer in the health, safety, and environmental requirements of handling toxic infrastructure, and the program looked far less like an office move and far more like brownfield fab construction, executed while the fab kept running.

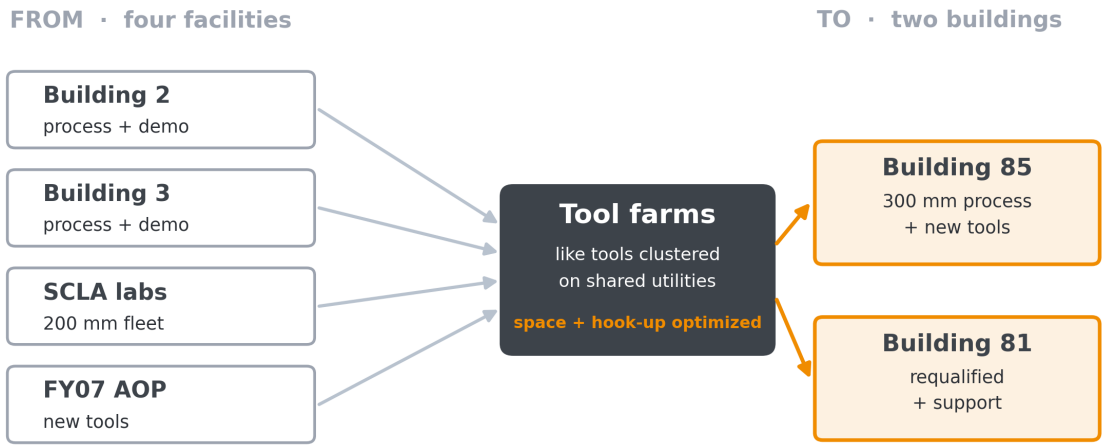

Figure 3. The shape of the program: four facilities collapsed into two buildings, with the fleet reorganized around shared-utility tool farms rather than around its old locations.

Why time was the real risk

The savings were not controversial; the schedule was. Because the target was a run-rate cut of about $5M a quarter, every quarter of delay was roughly $5M of savings Applied would never recover — a cost of delay that compounded against a program already carrying high safety, coordination, and customer risk. Our assessment found a capable organization running the largest, most complex program it had ever attempted. What it needed was not more effort. It needed a structure that made the schedule real, kept the tool owners inside the plan, and turned coordination from a source of friction into the thing that drove the work.

03

Section 03

How we solved it

lateralworks did not take the program over. We built the basic structure of the plan and then worked alongside Applied's program managers to implement it — the pattern in every FTTM engagement, where the goal is a client team that can run the method after we leave. The structure came in five moves: assess, schedule around tools, template the move, drive with refresh planning, and track the money. Each one is a lateralworks best practice, and each is described on the pages that follow.

Start with an assessment and name the cost of delay

We began by understanding the goal, the structure of the program, its current status, and the price of being late. That last piece mattered most. By putting a number on the savings lost per quarter of slip, we gave every later trade-off a common currency. A tool owner protecting a demo window and a facilities lead sequencing a bay fitup were no longer arguing about preferences; they were weighing decisions against the same clock. Naming the cost of delay is how fast teams turn a schedule from a document into a decision-making tool.

Build the schedule around tools, not buildings

The first real design choice was the axis of the plan. The obvious move was to schedule building by building. We deliberately did not. We engaged a program manager with deep subject-matter expertise to build a macro schedule organized around tool types and around what the team called tool farms — clusters of like tools sharing common utilities, which saved connection cost and used floor space efficiently. Scheduling around the tool let us stand up cross-functional tool teams, assign ownership cleanly, and — critically — bring the tool owners inside the planning process instead of leaving them outside it. A building-based schedule would have been harder to manage and, worse, nearly impossible to accelerate.

This is the lateralworks macro-micro method in practice. The macro plan gives management a single thread from start to finish — the view from 32,000 feet that ties the big pieces together — while the micro plan carries only the near-term detail the team needs to execute [1]. The macro mind-map for Lab Realignment held nine big buckets of work, each with explicit "doneness" criteria, from locking the tool plan through removing the 200mm fleet, completing the new infrastructure, closing buildings 2 and 3, moving and requalifying the 300mm tools, and landing the savings in the allocation pool. It is reproduced full-size on the next page.

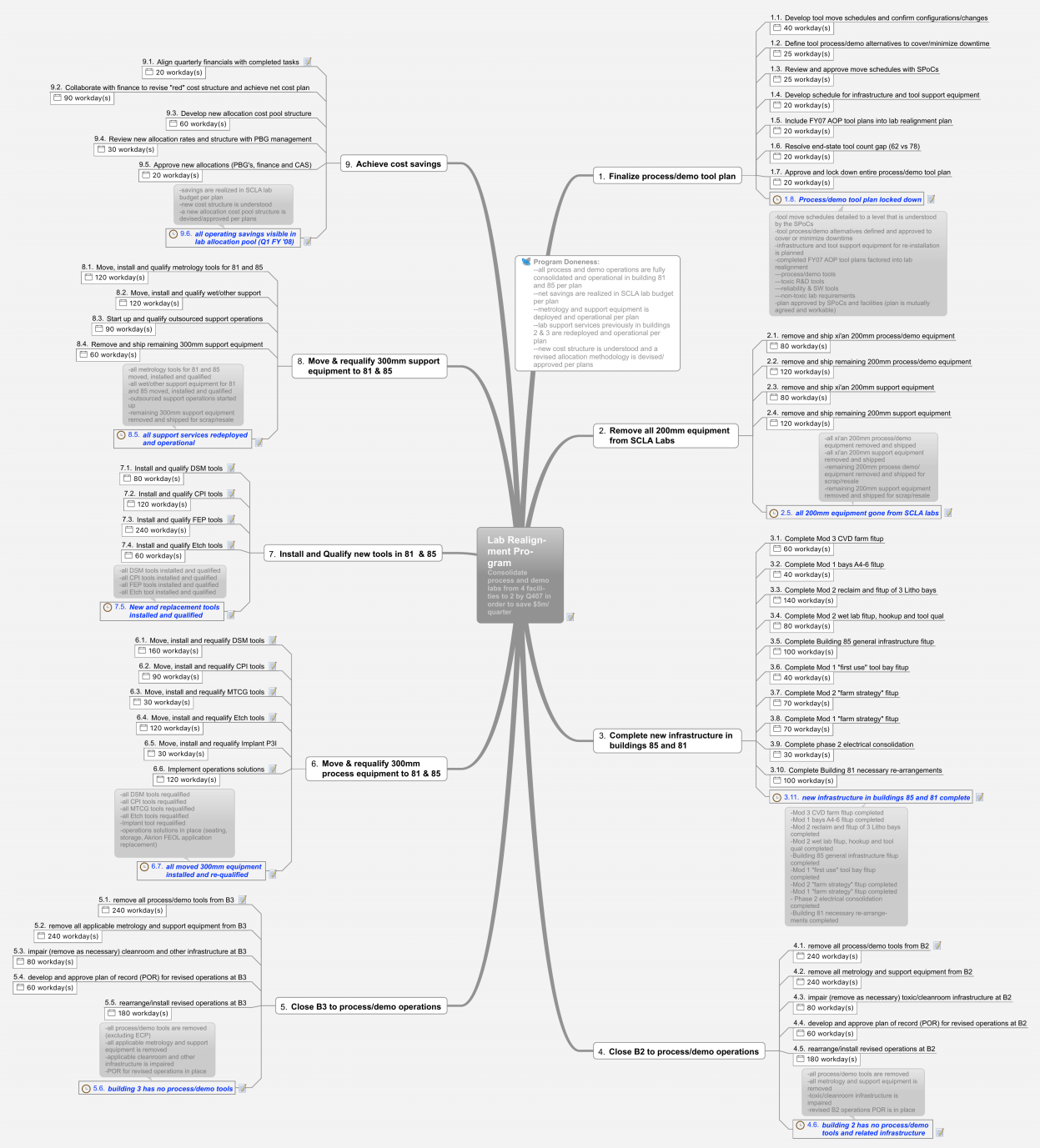

Figure 4. The Lab Realignment macro plan (2006). Nine buckets of work — from locking the tool plan to landing the savings in the allocation pool — each with its own doneness criteria, linking the goal (consolidate four labs into two and save $5M a quarter) to a single integrated critical path. Source: lateralworks / Applied Materials engagement.

Template the tool move once, then reuse it

Although a move could take months and pull in many groups, every tool followed essentially the same path. So we built one generic template: a repeatable set of steps, durations, and dependencies representing a typical decommission, move, install, and requalification. We built it around the milestones the product groups actually cared about, then scrubbed it with each technical function — not only to catch what was missing, but to earn buy-in to the process and to the specific dates each owner's tools would move.

What resulted was a roughly 150-activity tool-move template that mapped every major step of a move into a single continuous flow, start to end, aligned across the whole organization. It was the first time the complete process had been drawn as one contiguous thread. Beyond making the complexity visible, it gave every team a common framework they came to recognize, which lowered the felt difficulty of the problem. The template became standard work — reused after the program whenever a tool was installed or moved — and a baseline for continuous cycle-time improvement.

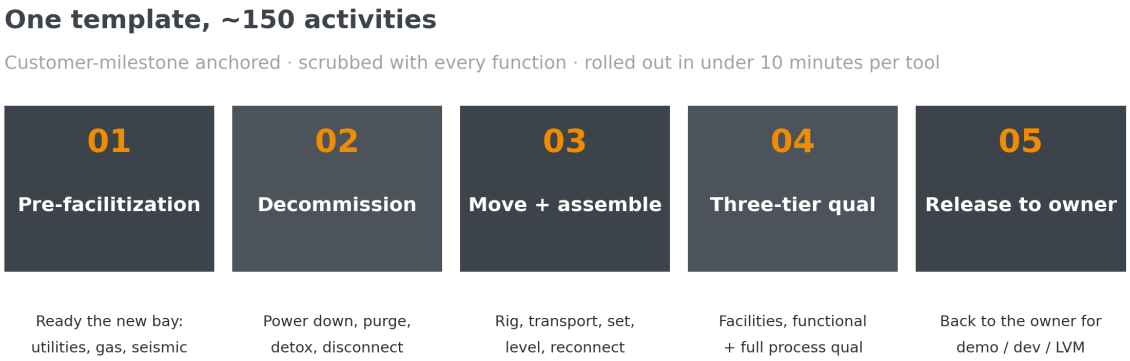

Figure 5. The repeatable tool-move template, reduced to its five phases. Anchored on customer milestones and scrubbed with every function, it was rolling out a full tool schedule in under ten minutes by its fifth use.

We rolled the template across the first ten tool moves into the master schedule. The tool-farm structure made each one quick to customize, and the first uses let us refine the template further. By the fifth use, dropping a complete tool-move schedule into the master plan took less than ten minutes. A months-long, multi-group orchestration had become a repeatable, ten-minute act of planning.

Drive the work with weekly refresh planning

A plan only accelerates a program if it stays honest. As the tool moves went into the master schedule, we started refresh planning — updating actuals and pulling in the schedule every week. Short-interval scheduling like this is a core fast-team practice: it manages trends before the fact rather than cleaning up messes after [1]. Tracking each tool's major milestones against their target dates immediately exposed which parts of the organization were beating the schedule and which were repeatedly slipping. Because the slips showed up as trends early, corrective action could be taken while it still mattered. Once it was, the schedule started to accelerate.

The same discipline solved the contractor problem the facilities retrofit created. Left to self-manage, vendors and contractors optimize their own piece — get in, get out, get paid — and the interfaces between them become where programs stall. We used the macro and micro schedule as the top-down framework and rolled the contractor detail up into it, so the critical integration points lived in the plan and were managed by the owner team rather than left to chance [2]. On a program juggling permits, inspections, and multiple

trades against live tool moves, managing those touch-points was the difference between coordination and chaos.

The reframing

A brownfield fab in disguise

It looked like a cost program. It behaved like the teardown and rebuild of two fabs — with the business still running inside them.

lateralworks engagement observation

Applied Materials Lab Realignment

Track the money as a schedule trend

The last move connected the schedule to the savings. lateralworks built a financial tracking, analysis, and reporting model that treated cost reduction the same way we treat a schedule: as a trend of actual against forecast against target, with a clear target date. The model rolled detail up from a single source — every tool, its migration cost, its disposition, its projected run-rate saving — into an executive summary and a set of "wiggle charts" that showed, at a glance, whether realized savings were tracking to plan. Managers could slice the same data by tool type, product group, building, or platform, and see cumulative or quarterly, actual or baseline, in one place.

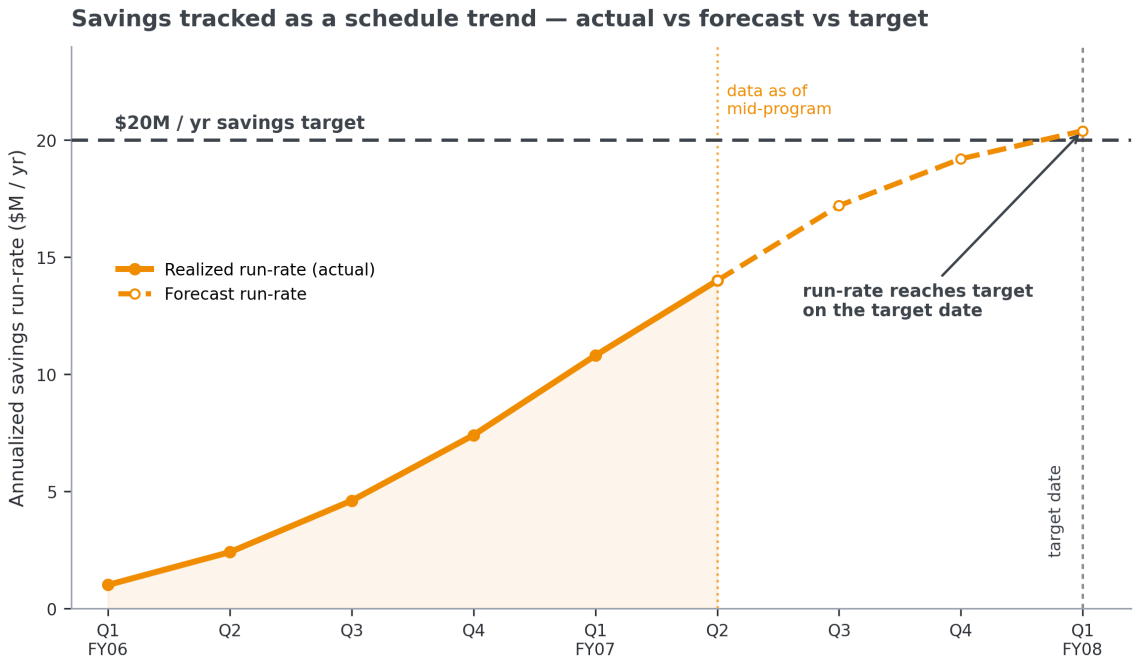

Figure 6. Savings modeled the FTTM way — as a schedule trend. Realized run-rate (solid) and forecast (dashed) are tracked against the $20M-a-year target and the target date, so a shortfall appears as a trend the team can correct, not a surprise at year-end. Illustrative of the tracking method; not Applied's reported figures.

The point of showing savings this way is the same as showing schedule this way: a gap becomes visible as a trend, early, while there is still time to close it. A number that only arrives at the end of the year can only be explained. A trend can be managed. The tracking model turned the $5M-a-quarter cost of delay from an abstraction into a line every stakeholder could watch.

Figure 7. A view of the lateralworks financial tracking model — the "savings forecast" dashboard and wiggle chart, with actual savings plotted as a solid line and the forecast as a dashed line, converging on the target by the target date. Shown from a representative lateralworks program to illustrate the method used on Lab Realignment.

04

Section 04

The financial payoff

The program did what it set out to do, on the timeline it set out to do it. Lab Realignment was the largest, most complex program this group had ever run, and it beat its own schedule while staying ahead of its annual savings targets — over eighteen months, without interrupting production, demonstrations, or development.

$20M/yr	4 → 2	60+ tools	0
savings target met on schedule	buildings consolidated	relocated and requalified in 18 months	interruption to the running business

The savings landed on plan

The cost target was the whole point, and it was met on time. Because the schedule had been accelerated deliberately — pulled in before it could slip — the run-rate reductions arrived quarter by quarter as the tools came out of the old buildings and the infrastructure was retired, rather than bunching up at the end where a late finish would have burned real money. The financial model made this visible the entire way, so finance and the product groups were reconciling to the same forecast instead of arguing over it after the fact. The savings then had to be made structural — worked into a revised cost and allocation model so the reductions showed up in the lab budget and stayed there.

The business never stopped

No customer demonstration was missed for the sake of a move. No low-volume production line went dark because its tool was in transit. Development projects kept their tools available inside the windows the plan protected. This was the hardest constraint in the whole program and the one most easily lost in a cost push — and it held, because the schedule was built around the owners' milestones from the start rather than bolted on later.

A durable capability, not just a finished project

Two assets outlived the engagement. The first was the move template, now refined to the point that almost any tool move can reuse it as-is, with little or no modification — the standard way Applied installs and relocates tools and a baseline for ongoing cycle-time reduction. The second was harder-won: for the first time, the technical functions and the product groups had worked together seamlessly, on one plan, toward one goal. The "us versus them" divide that had shaped those relationships gave way to shared ownership, and productivity and internal customer satisfaction rose with it.

05

Section 05

Why it worked

Nothing about the result depended on working harder than the previous plan. It depended on a handful of best practices lateralworks has drawn from three-plus decades of research into how the fastest technology teams actually operate [3]. Lab Realignment is a clean demonstration of them.

Organize around the flow of value, not the map

Scheduling around tools and tool farms rather than buildings is the same instinct that drives fast teams to organize laterally around the flow of work rather than vertically around functional silos. The lateral touch-points — the handoffs between facilities, the product groups, and the move crews — are where a program of this kind lives or dies, and putting them at the center of the plan is what let cross-functional tool teams own outcomes end to end.

Plan top-down, then let the macro drive the detail

The macro mind-map came first, and the detailed schedules were driven from it — not the other way around. lateralworks builds the top-down macro plan, then rolls the contractor and vendor detail up into its critical interface points, because building schedules bottom-up and hoping to integrate them later is how large programs drown in stale data [1]. On Lab Realignment that top-down frame is exactly what kept a facilities retrofit full of independent contractors pulling in one direction.

Make the schedule real, then accelerate it

Weekly refresh planning kept the plan honest, and an honest plan can be pulled in. Fast teams accelerate a schedule on purpose so they can hit it on time, because a schedule's natural drift is to the right if left alone [3]. Tracking milestone trends against target dates surfaced slips as signals, early enough to act on. The same trend discipline, applied to savings through the financial model, kept the money on the same short leash as the schedule.

Build capability, not dependency

lateralworks supplied the structure and then helped Applied's own program managers run it. The measure of the engagement is not that the program finished — it is that the template and the method stayed behind and kept working. That is the intended shape of an FTTM engagement: leave the client able to do it themselves [4].

Applied Materials had the talent and the will to run this program. What lateralworks added was a structure that let that talent move fast without breaking the business — a schedule built around the right axis, a move templated once and reused, a plan refreshed weekly, and a cost target tracked like a trend. It looked like a cost program. It was run like a fab.

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