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Thank you for participating,

A handwritten signature in black ink that reads 'G. Hamilton'.

Gregory Hamilton
President
Aviation Week Network

Acknowledged, agreed, and submitted by

A handwritten signature in black ink that reads 'Ed Woodruff'.

Nominee’s Signature

7/12/2024

Date

Nominee’s Name (please print): **Ed Woodruff**

Title (please print): **Director, Program Management Office**

Company (please print): Top Aces Corp.

NOMINATION FORM

Name of Program: F-16 Advanced Aggressor Fighter

Name of Program Leader: Ed Woodruff

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Customer Approved

○ Date: N/A

○ Customer Contact (name/title/organization/phone): _____

Supplier Approved (if named in this nomination form)

○ Date: N/A

○ Supplier Contact (name/title/organization/phone): _____

**PLEASE REFER TO PROGRAM EXCELLENCE DIRECTIONS
AS YOU COMPLETE THIS FORM.**

SECTION 1: EXECUTIVE SUMMARY

Make the Case for Excellence

Value: 10 points

Use 12 pt. Times Roman typeface.

What is the vision for this program/project? What unique characteristics and properties qualify this program for consideration?

Top Aces provides adversary air (ADAIR) training to the world's leading air forces and has the largest fleet of contractor owned, contractor operated fighter aircraft in active service. Our company's purpose is to help develop tomorrow's combat leaders by providing the most advanced and realistic training available, while creating significant cost efficiencies and extending the aircraft lifecycle for our nation's military fleet. And our vision for this program is to field, sustain, and continue to innovate on the most advanced ADAIR training platform possible for our aerial warfighters to ensure their success against peer and near-peer threats.

Top Aces is unique as the first and only company in the world to privately own and operate a fleet of F-16 fighter aircraft. The F-16 is a true fourth generation, supersonic fighter, ideal for preparing the next-generation of U.S. fighter pilots flying advanced 5th generation aircraft such as the F-35 Lightning II and F-22 Raptor for aerial conflict with peer adversaries. Our design, development, fielding and sustaining of a highly advanced and integrated Advanced Aggressor Fighter (AAF) version of the venerable F-16A in a commercial environment is without peer in the industry.

The foundation of this program was laid several years ago with a forward leaning and innovative spirit focused on applying modern capabilities to early—yet still highly maneuverable and adaptable—version (Block) of F-16 to successfully transform it into highly capable adversary fighter aircraft, the Top Aces AAF program. AAF program objectives included the development, integration, and installation of a complex avionics package into former Israeli Air Force F-16A aircraft purchased by Top Aces. The AAF modification specifically integrates a modern active electronically scanned array (AESA) fire control radar, helmet-mounted cueing system (HMCS), long-wave scanning Infrared Search and Track (IRST) system, Link-16 tactical datalink capability, a bespoke ADAIR operational flight program (OFP), and a tailored multi-function display, all powered by an industry-leading and innovative open architecture mission system which also permits the rapid integration of additional sensors and functions that a customer wishes to use to improve their air combat readiness.

Top Aces' overall design, engineering and fabrication work was accomplished in an extremely compressed timeline and at a significant cost reduction compared to similar DoD-sponsored integration efforts on other 4th generation fighter platforms currently in service. Top Aces' first F-16s arrived in the US in late January of 2021, received FAA certification and first flew in May of 2021, and the first AAF F-16 successfully demonstrated its advanced capabilities in January of 2022—only one year after arriving in pieces at Top Aces Mesa, AZ, headquarters. The USAF rapidly put Top Aces' AAF F-16s on contract supporting 5th Gen training at both Eglin AFB, FL, and Luke AFB, AZ, and the contributions to 5th Gen pilot training were immediate. With the advanced capabilities of the Top Aces' AAF F-16, 5th Gen fighter pilots moved from a negative training environment where their mistakes and bad habits went undetected by other, older ADAIR aircraft, to an era where Top Aces tests and validates US 5th Gen tactics and signature management and punishes tactical mistakes on a daily basis. The profound impact this program has had on our warfighters by providing realistic, near-peer threat training is immeasurable, although thoroughly documented in glowing formal mission evaluation reports provided by the end-user customers flying F-35s and F-22s as testaments to Top Aces AAF value and success.

Innovation and collaboration are the cornerstones of Top Aces' F-16 AAF program, fueling immediate contributions to the warfighter and the ADAIR industry, and making immediate impacts on warfighter readiness. These aspects make this program worthy of recognition as an Aviation Week Network's Laureate Award winner.

DIRECTIONS

- **Do not exceed 10 pages in responding to the following four descriptions.**
 - Allocate these 10 pages as you deem appropriate, but it is important that you respond to all four sections.
- DO NOT REMOVE THE GUIDANCE PROVIDED FOR EACH SECTION.
- Use 12 pt. Times Roman typeface throughout.
- Include graphics and photos if appropriate; do not change margins.

SECTION 2: VALUE CREATION

Value: 15 points

Please respond to the following prompt:

➤ **Clearly define the value of this program/project for the corporation; quantify appropriately**

The AAF program has provided massive value to Top Aces as a whole, directly contributing to a \$35M increase in annual revenue to the company starting in 2023, nearly doubling its annual operating revenue. Subsequent additional ADAIR training contract awards in excess of \$15M in 2023 and continuing into 2024 due primarily to the use of our AAF-upgraded F-16s have resulted in the company's overall valuation increasing, attracting further private equity investment for future business. The successful introduction and now routine use of the industry-leading and unique advanced capabilities manifested in the AAF program have resulted in Top Aces becoming the ADAIR provider of choice for DoD's 5th Gen fighters. Sky-high customer satisfaction with Top Aces' sustained AAF performance has resulted in a commensurate increase in private equity confidence in the company's strategic direction and priorities enabling Top Aces to upgrade three additional F-16s to the AAF configuration for current contract performance, with increased customer demand for more AAF upgrades forecasted in 2025 and beyond.

The deliberately sustainable design of the AAF upgrade maximizes aircraft availability both at the normal operating locations where daily flying operations are executed, and also when flying ADAIR missions at other temporary locations for DoD-directed exercise participation such as RED FLAG at Nellis AFB, NV. Additionally, annual Phase inspections and any additional necessary MRO is more easily performed on the AAF-upgraded F-16s than legacy F-16s, minimizing aircraft downtime and maximizing both revenue generation capacity and continuous high customer praise for each AAF sortie flown.

The federated and open system architecture nature of the Advanced Aggressor Mission System (AAMS), which is the core of the AAF upgrade, enables concurrent engineering and rapid reprogramming to continuously improve AAMS capabilities, pilot-vehicle interface (PVI), and system efficiencies without the need for repeated airworthiness recertification from either the FAA or DoD Technical Airworthiness Authorities. This maximizes aircraft availability, increasing customer satisfaction which then drives up demand for more of our F-16s to be upgraded to perform on more revenue-generating contracts. The speed at which Top Aces can incorporate pilot and customer feedback into the AAF F-16s is unmatched in the industry, and a clear discriminator for the competitive landscape, further cementing Top Aces' position as the industry leader in advanced training solutions.

➤ **Clearly define the value of this program/project to your customer**

The primary value of Combat Air Forces (CAF) Contracted Air Services (CAS) contract with the USAF is to provide advanced ADAIR training for our air forces to remain the most capable and best trained in the world. The contract use of commercial company-owned fighter aircraft prevents consuming the life of limited and quite expensive USAF 5th gen fighter aircraft. And the use of civilian pilots and aircraft to perform the ADAIR mission prevents diluting USAF frontline combat pilots' focus when they are required to fly and execute ADAIR tactics during their precious flight hours, instead of practicing CAF tactics they need to hone for actual combat use. Since introducing it to the customer in November of 2023, the Top Aces AAF program has completely changed the training landscape for the better for USAF and USMC 5th gen tactical air customers. Strongly positive end-user formal feedback immediately skyrocketed, and increased their requests for more of the game-changing AAF capabilities. Shortly after AAF flying operations began, one F-22 Squadron Commander noted "The avionics of the [AAF] is above and beyond what other companies have...[and] makes it a great adversary" (20 Jan 2023, Tyndall AFB), and an F-22 Instructor Pilot noted the value of Top Aces AAF with "My favorite adversary to fight against. They use their [AAF] to replicate challenging threats and provide outstanding threat replication." (23 Feb 2023, Tyndall AFB). These are just two examples of what has become consistent and strongly positive formal feedback. In fact, over the course of the first year of AAF use on contract, official contract mission review forms noted the AAF training as "great," "awesome," "excellent," "outstanding," and "the best" for professional threat replication and overall effective training over 500 times. Such high praise and end-user customer satisfaction led the USAF CAF CAS contracting office to evaluate Top Aces overall performance as "EXCEPTIONAL" in back-to-back formal CPAR ratings in all categories—an unprecedented achievement under this ADAIR contract.

Finally, in another unprecedented example of the value to our customer, the USAF contracting office so highly values the Top Aces AAF program for its ability to rapidly integrate new and unique threat capabilities, within weeks of initial award they restructured the terms of the contract to enable and fund Top Aces acquisition, integration and fielding of the most advanced threat system available in the commercial market, a long-wave infrared search and track (IRST) system, which is critical for training 5th gen combat aviators. No other company was able to offer such a rapid integration and fielding option, setting Top Aces AAF program above all others in the industry.

➤ **Clearly define the value of this program/project to members of your team; quantify if possible**

The AAF program has provided challenging and highly rewarding work for the Top Aces and associated industry team, making it a highly desired to program to work on. Due to the AAMS flexibility and adaptability, the outlook for continued upgrades and refinements throughout the life of the program contributes to high morale for all employees from all the companies associated with the AAF program. Additionally, the ability of each member to make value-added contributions and quickly see the positive results of their efforts on improved CAF warfighter training provides high employee satisfaction, increasing retention of highly qualified, experienced and motivated personnel. The personal satisfaction derived from overcoming countless US Government and commercial obstacles and naysayers who did not believe we could achieve what we have (and continue to do) is high as exhibited by 100% retention of all Top Aces employees contributing to the AAF program.

For our highly experienced maintenance technicians and leaders, the use of modern component technology for the AAF directly results in ease of maintenance and sustainment, especially compared with many OEM components that are now obsolete and difficult to acquire and work with. By using newer systems, they also drive improvements in tools and diagnostic equipment when compared to the legacy components replaced, and reduce the amount of touch time required to resolve issues. These combined factors further support the lower overall operating cost and allows our maintenance team to quickly return an aircraft to service when something does fail.

The AAF program has also directly increased the desirability of working for Top Aces for elite DoD fighter pilots. The AAF program has continued to motivate and attract highly talented and experienced retired fighter pilots to Top Aces, providing the company with corresponding increased capacity and flexibility to pursue even more advanced threat integration options: a positive feedback loop that has enabled further business growth. Top Aces retains an enviable backlog of top pilot talent awaiting a call to join our team, and our sustained AAF program performance is the primary factor in that human resource advantage.

➤ **Clearly define the contribution of this program/project to the greater good (society, security, etc.)**

The purpose of this company is to prepare the next generation of combat leaders. Our US and Allied freedoms are secured by national defense postures that deter and—if needed—engage in combat to neutralize or defeat threats. US and Allied Combat Air Forces (CAF) require highly trained, competent and respected leaders to succeed, and competence and respect is gained through training against realistic threats as often and in as many different scenarios as possible. Everything Top Aces does as an enterprise is in pursuit of this purpose, because it is fundamental to our continued success as a nation. The AAF program is the embodiment of that purpose, as it provides the absolute best available tactical threat training to ensure national defense. Lesser training capabilities present a false understanding of what challenges peer and near-peer threats can present to our combat aviators and leaders, but the AAF presents the most realistic and challenging threats to ensure our CAF is prepared to engage with and defeat the most advanced threats. The highly integrated advanced threat systems on our AAF in the hands of our highly experienced ADAIR instructor pilots ensure our frontline CAF aviators are fully trained on what they can expect to face with our most challenging foes, and that realistic training only available with our AAF greatly increases the odds of prevailing against any enemies and returning home safely to their families.

SECTION 3: ORGANIZATIONAL BEST PRACTICES AND TEAM LEADERSHIP

Value: 35 points

Use 12 pt. Times Roman typeface

Please respond to the following prompts:

➤ **15 points: Describe the innovative tools and systems used by your team, how they contributed to performance and why**

The team utilized several innovative tools during the transition from achieving the fielding of the AAF prototype to the successful and enduring AAF sustainment effort. First, lessons learned were documented in a SharePoint library allowing the team to capture important information. An example of one lesson learned was that a prefabricated (non-airframe specific) wire harness was being re-clocked by the technicians because it was a preferred orientation. However, the supplier potted the wires so in this example, while intending well, the rotation of the backshell pulled wires loose in a harness that could not be repaired. Training from this lesson learned reduced this failure rate and resolved an operational issue during assembly.

Second, we used an innovative service tool developed by our technology partner that is called our Mobile Test Cart (MTC). This MTC is connected to the aircraft to perform advanced maintenance functions such as checking communications between systems, testing software updates on actual hardware, and providing a means to operate the equipment remotely by the Engineering team. It has been recognized and awarded by US Government agencies for its innovative design and use, which reduces

required labor and logistics to quickly, efficiently and effectively resolve avionics issues of the AAF systems on multiple occasions.

The third innovative tool was our improvement prioritization log developed in SharePoint. This tool captured improvement opportunities and allowed the team to prioritize which ones should be addressed first, second and so forth. It also served as a place to capture notes and allow the team to make informed decisions about the improvement being made. In addition, it provides real-time visibility and status on the progress of the change from any device, making it especially useful to a team using a diverse array of devices and from geographies spread over thousands of miles.

➤ **10 points: Define the **unique** practices and process you used to develop, lead and manage people?**

The Top Aces team utilized practices and processes unique to the AAF program, such as the seamless integration of the pilot, maintenance, engineering and project management office (PMO) talent resident in our own company as well as the subject matter expertise (SME) and experience of both 1099 contract assistance and enduring support from our technology partner. Just as the AAMS (that comprises the AAF) is modular but integrated into a coherent and seamless product for the pilot to maximize effectiveness of the system, the PMO approached the AAF program itself as an opportunity to leverage “modular” SME expertise, technology partner knowledge and experience, and supplier contributions into an integrated and seamless management “product,” by establishing common communication methods within and between “modules” of experts, and then setting the timing and frequency of those communications of different “modules” of experts to maximize effectiveness of sustaining the AAF program without negatively affecting any of the individuals regular work flows. In modeling the program sustainment framework after the unique advantages the AAF program offers to our customers, our PMO enabled clear and concise communications throughout the AAF sustainment enterprise, reducing time required to conduct routine and non-routine tasks, and maximizing team member satisfaction.

➤ **10 points: How did you leverage skills and technologies of your suppliers?**

As outlined above in the various examples already given, the key to leveraging skills and technologies of our suppliers is to build an A-team of industry leaders with expertise in the fields needed, develop good relationships with the team from the leadership level down to the working level, and develop a strong network of suppliers to assist where possible. During the prototyping project and extending into the long-term sustainment effort the team, additional suppliers and sub-contractors were used to fabricate parts, purchase materials, and consult on regulatory, communication, testing, and compliance related topics. Having the right individuals and resources on the team is truly required to successfully further a program such as this modification, and even more important to have when risks become issues, and something does not go as planned. A high performing team will find solutions and relentlessly strive toward the finish line. The PMO invested the time and effort needed to be fully aware of the skills and technologies available with suppliers, and reached out to them individually or as small teams to accomplish necessary tasks.

SECTION 4: DEALING WITH PROGRAM COMPLEXITY

(VOLATILITY, UNCERTAINTY, COMPLEXITY, AMBIGUITY, or VUCA)

Value: 25 points

Use 12 pt. Times Roman typeface

Please respond to the following prompts:

- **10 points:** Describe UNIQUE areas of VUCA faced by your program and why. (Please avoid the issues surrounding Covid-19 pandemic, which was faced by all programs.)

On October 7, 2023, Hamas attacked the state of Israel and began a war which quickly consumed all the attention and available bandwidth of both the Israeli Ministry of Defense (IMOD) and Israeli-based aerospace and defense contractors. Top Aces' entire fleet of F-16A aircraft are ex-Israeli Air Force assets purchased from the IMOD and modified, prepared and shipped by key Israeli defense contractors. In addition, a number of critical components for Top Aces' AAF modification are of Israeli origin, and Israeli-based defense contractors play key roles in AAF sustainment. This development of a major war in the Middle East was completely unexpected and injected tremendous levels of volatility and uncertainty into Top Aces' efforts to sustain and continuously improve its AAF aircraft. Not only were all shipments of aircraft and components halted, but the timeline of the delays was unknowable, subject to the demands of a war of indeterminate length and intensity. In addition, logistics, engineering and other assorted experts who were important to Top Aces' supply and sustainment efforts were called up to Reserve status in the Israeli Defense Forces or called away to other higher-priority taskings within their organizations, rendering them unavailable for unknown periods of time.

Another AAF challenge that dealt with significant amounts of uncertainty and complexity was Top Aces' effort to develop an Infrared Search and Track (IRST) capability as part of continuous improvement to the overall modification. Training to fight and win against passive detection and targeting systems is critical for Top Aces' 5th Gen customers, and IRST quickly became a must-have capability for the state-of-the-art F-16 AAF. As Top Aces is a small company with limited resources, purchasing an "all up round" fielded system equivalent to what the USAF is procuring for actual combat use was deemed too expensive, and unnecessary for the training role we fulfill. As a small, lightweight fighter, the F-16 is extremely constrained on available avionics or sensor space. Although several varieties of externally-mounted pods were considered viable, there were uncertainties on cooling requirements, aerodynamic suitability and airworthiness considerations for each. Coupled with the uncertainty surrounding an external pod, Top Aces also had to manage reluctance on the part of major IRST sensor manufacturers to fill an uncharacteristically small order from a non-government customer. Additionally, integrating the IRST onto the aircraft and developing an effective and flexible Pilot-to-Vehicle Interface (PVI) in-house added significant levels of complexity to the project.

Top Aces also faced significant challenges with ambiguity in its attempt to use Artificial Intelligence (AI) engines to "fly" constructive entities as wingmen alongside the F-16 AAF. Knowing that 5th Gen customers require larger numbers of training adversaries but respecting the Government's need to stay within budget parameters, Top Aces began the development in Summer 2023 of technologies that could inexpensively add constructive "adversary aircraft" to provide targeting challenges for customer fighters. This was a unique and innovative concept at that point, and the AI technology, integration and datalink network that could be utilized to bring it all together were ambiguous.

- **15 points:** Explain how your team responded to these challenges. What changes did you make, what were the results?

In responding to an unexpected war in the Middle East and extreme volatility with multiple elements of aircraft delivery and sustainment, Top Aces partnered with alternative suppliers, developed innovative processes, and created in-house solutions to overcome the resulting challenges. Working through business networks and utilizing multiple contacts, Top Aces was able to locate alternative sources, both within Israel and externally, who could assist with elements of the aircraft preparation, shipping, and supply chain that had been interrupted by the war. Eventually, the remaining five F-16 aircraft still in Israel arrived in the US through innovative means and were added to the Top Aces' fleet as potential AAF prospects. Working tenaciously with OEMs for access and

innovative ideas, Top Aces was able to piece together the technical expertise and software support required to continue upgrade work on key AAF components, often utilizing alternative divisions and engineers within Israeli suppliers who had bandwidth. Additionally, Top Aces' engineers and program managers collaborated obsessively with long-time US integrator CTSi to reimagine elements of AAF hardware that could be sourced alternatively or built in-house and portions of software that could be completed by the US team.

Simultaneous to the Israeli disruptions, the integration of IRST capability to the AAF platform entered its busiest phases. First, Top Aces tackled the uncertainty surrounding acquisition of an external pod and compatible IRST processor/sensor unit by exploring, analyzing and assessing multiple alternatives based on price, features and availability. The IRST processor/sensor fell into place first, based mostly on price and the OEM's willingness to deal with a small order to a non-government customer, but the major challenge of integrating it into a suitable external pod remained. Top Aces' program manager meticulously assessed every option that could be somehow mounted on an F-16, from fuel tanks to travel pods to non-traditional AFRL-developed AgilePods, before partnering on an innovative application of an existing IRST pod. The complexity of integrating a new sensor into the unique and somewhat antiquated Hands-On Stick and Throttle (HOTAS) configuration of the F-16A through Top Aces' proprietary open-architecture Advanced Aggressor Mission System (AAMS) was confronted in-house. Utilizing hardware emulation and their software-in-the-loop simulator, Top Aces and partner CTSi created a unique Pilot to Vehicle Interface (PVI) that optimizes the IRST's capabilities for exploitation by a single-seat fighter pilot.

Although IRST has developed into a top-tier capability on many Western fighter aircraft over the past 15 years, the development of a shared training concept utilizing constructive entities hosted solely onboard a fighter remains unique to advanced 5th Gen aircraft. Hence, Top Aces' ambition to develop the concept from the ground up on a 40-year-old 4th Gen fighter without Government or OEM support was shrouded in ambiguity. Partnering with the industry-leading AI firm EpiSci was a critical first step, allowing experts from both Top Aces and longtime partner CTSi to chart a vision of what might be possible using the onboard AAMS as a software host. Once the end state for the project was defined, Top Aces' project manager and experienced aggressor pilots further tailored the behaviors and control applications that would bring the most training value for each phase of the project. Engineers identified the most suitable datalink and mapped out the embodiment of the constructive entities to optimize training effectiveness. With clear tasks and objectives, the project team was able to effectively collaborate on execution throughout 2024, leading to a successful demonstration of Basic Functionality in June 2024 and then moving forward to the next phase.

SECTION 5: METRICS

Value: 15 points

Use 12 pt. Times Roman typeface

Please respond to the following prompts, where predictive metrics indicate items that provide a view of how yesterday's actions and today's actions will affect the future timeline, cost or other requirement.

Provide charts/graphs that illustrate performance to these metrics:

➤ What are your predictive metrics?

The two best metrics we used to drive performance were 1) completion of daily production tasks and 2) a monthly labor report. A scrum style management process was used to track daily progress. Each aircraft build was sub-divided into critical phases: removals, wiring harness assembly, electrical and mechanical installation by equipment bay, acceptance inspections, ground testing, flight testing, and reporting. The tasks that needed to be completed were placed on a spreadsheet and planned out for each week. Tasks were sized to roughly a day's work.

The modification production team met on the floor daily to discuss tasks for the day. The goal was to report that the task was completed and to move onto the next one in sequence. If not achieved, there was a discussion which identified any issues that were preventing tasks from progressing. This approach allowed larger tasks to be broken down into manageable tasks. By meeting daily on expectations for each day, slips or issues were identified almost immediately. For example, the most common reason for not achieving the work for the day was due to interruptions caused by other demands such as being asked to work a different task, or to assist with another activity. By breaking the tasks down into nearly a daily resolution, slips at a small scale become visible right away. This was a predictive metric. It is able to identify issues quickly and on a more frequent basis.

While this approach kept an eye on the day-to-day progress associated with task progression, looking at the labor report on a monthly basis provided a second look at the project health. Because we are a relatively small and lean organization, team members are often not fully dedicated to a single activity. Different activities were tracked by different charge codes. This was a more reactive metric that lagged the daily task completion and provides some further insight as to the causes when performance against schedule or cost suffers.

➤ **How did you perform against these metrics?**

Most commonly, each day’s production status meeting was routine, and progress was achieved. More often than as project managers we’d like to admit, there were days where we didn’t complete everything that was planned and observed instances of missing the day’s objective. These opportunities provided frequent and value-added discussion points to the causes. The three most common issues were 1) reassignment of labor due to competing priorities (other activity needed a resource) and 2) part shortage causing a work delay, and 3) unplanned rework.

With respect to monitoring the monthly labor metric, we were able to see periods when competing priorities influenced the available labor. We saw on several instances when the team had been struggling with task completion and resource availability was identified as the cause, the monthly labor charge showed a decrease in the charging. When parts shortages were an issue for more than a few days instances, we saw daily completion decrease.

➤ **How do your predictive metrics drive action toward program excellence? Please provide examples.**

Program slips occur slowly and are more difficult to see with traditional large high-level schedules. Overall progress is a cumulative effect of daily progress. Using the metrics identified above allowed us early detection opportunities when the project was not progressing to plan, which in turn assisted in early correction to keep the project on track. When daily progress didn’t meet the objectives, it quickly highlighted the root causes.

By using both measures we are able to get a better idea of challenges and causes and how to fix them. Some examples are:

Daily Progress	Monthly Labor	Common Cause
Low	Low	Insufficient resources
Low	Normal	Work stoppage / efficiency
Low	High	Work stoppage / efficiency
High	Low	Learning curve / efficiency gains
High	Normal	Tracking to plan
High	High	Inefficient use of labor, or plan too aggressive.