

esc Aerospace US, Inc.

Business Plan

February 15, 2023



esc Aerospace US, Inc.

3259 Progress Drive

Orlando, FL 32826

www.esc-aerospace.us

Contacts

Lars Weimer

President and CEO

(407) 965-9679

lars.weimer@esc-aerospace.us

Danny Stirtz

Executive Vice President

(407) 579-5869

danny.stirtz@esc-aerospace.us

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NOTE REGARDING FORWARD LOOKING STATEMENTS

- THE INFORMATION SET FORTH HEREIN CONTAINS “FORWARD-LOOKING INFORMATION”, INCLUDING “FUTURE-ORIENTED FINANCIAL INFORMATION” AND “FINANCIAL OUTLOOK”, UNDER APPLICABLE SECURITIES LAWS (COLLECTIVELY REFERRED TO HEREIN AS FORWARD-LOOKING STATEMENTS). EXCEPT FOR STATEMENTS OF HISTORICAL FACT, THE INFORMATION CONTAINED HEREIN CONSTITUTES FORWARD-LOOKING STATEMENTS AND INCLUDES, BUT IS NOT LIMITED TO, THE (I) PROJECTED FINANCIAL PERFORMANCE OF THE COMPANY; (II) COMPLETION OF, AND THE USE OF PROCEEDS FROM, THE SALE OF THE SHARES BEING OFFERED HEREUNDER; (III) THE EXPECTED DEVELOPMENT OF THE COMPANY’S BUSINESS, PROJECTS, AND JOINT VENTURES; (IV) EXECUTION OF THE COMPANY’S VISION AND GROWTH STRATEGY, INCLUDING WITH RESPECT TO FUTURE M&A ACTIVITY AND GLOBAL GROWTH; (V) SOURCES AND AVAILABILITY OF THIRD-PARTY FINANCING FOR THE COMPANY’S PROJECTS; (VI) COMPLETION OF THE COMPANY’S PROJECTS THAT ARE CURRENTLY UNDERWAY, IN DEVELOPMENT OR OTHERWISE UNDER CONSIDERATION; (VII) RENEWAL OF THE COMPANY’S CURRENT CUSTOMER, SUPPLIER AND OTHER MATERIAL AGREEMENTS; AND (VIII) FUTURE LIQUIDITY, WORKING CAPITAL, AND CAPITAL REQUIREMENTS. FORWARD-LOOKING STATEMENTS ARE PROVIDED TO ALLOW POTENTIAL INVESTORS THE OPPORTUNITY TO UNDERSTAND MANAGEMENT’S BELIEFS AND OPINIONS IN RESPECT OF THE FUTURE SO THAT THEY MAY USE SUCH BELIEFS AND OPINIONS AS ONE FACTOR IN EVALUATING AN INVESTMENT.
- THESE STATEMENTS ARE NOT GUARANTEES OF FUTURE PERFORMANCE AND UNDUE RELIANCE SHOULD NOT BE PLACED ON THEM. SUCH FORWARD-LOOKING STATEMENTS NECESSARILY INVOLVE KNOWN AND UNKNOWN RISKS AND UNCERTAINTIES, WHICH MAY CAUSE ACTUAL PERFORMANCE AND FINANCIAL RESULTS IN FUTURE PERIODS TO DIFFER MATERIALLY FROM ANY PROJECTIONS OF FUTURE PERFORMANCE OR RESULT EXPRESSED OR IMPLIED BY SUCH FORWARD-LOOKING STATEMENTS.
- ALTHOUGH FORWARD-LOOKING STATEMENTS CONTAINED IN THIS PRESENTATION ARE BASED UPON WHAT MANAGEMENT OF THE COMPANY BELIEVES ARE REASONABLE ASSUMPTIONS, THERE CAN BE NO ASSURANCE THAT FORWARD-LOOKING STATEMENTS WILL PROVE TO BE ACCURATE, AS ACTUAL RESULTS AND FUTURE EVENTS COULD DIFFER MATERIALLY FROM THOSE ANTICIPATED IN SUCH STATEMENTS. THE COMPANY UNDERTAKES NO OBLIGATION TO UPDATE FORWARD-LOOKING STATEMENTS IF CIRCUMSTANCES OR MANAGEMENT’S ESTIMATES OR OPINIONS SHOULD CHANGE EXCEPT AS REQUIRED BY APPLICABLE SECURITIES LAWS. THE READER IS CAUTIONED NOT TO PLACE UNDUE RELIANCE ON FORWARD-LOOKING STATEMENTS.

1.0 Our Customer’s Need

Advances in technology have become such an integral part of day-to-day life that we can hardly imagine a world without them. We are truly living in the day of the *Jetson’s*.



It would be unbearable not have access to any of our technologies (such as the Internet, and smart phones, etc.). However, there is one technology which is just as omnipresent as the Internet and that most of us do not even realize how dependent we are on it ... **GPS**.



Over fifty years ago, who knew how pervasive GPS would become? When we think of GPS, most of us think of our smart phone or car navigation system. However, GPS is the world standard for **Positioning, Navigation, and Timing (PNT)**. From natural interferences to growing terrorist threats, our total dependence on GPS is problematic. There is hardly a system today (military or commercial) that is not totally dependent on GPS for position and/or time. Without it, financial systems may fail, autonomous vehicles might crash, military missions could fail, and lives could be lost.

Having an alternative solution is crucial.

Our solution is critical to meeting US National Defense needs
Section 1618 of the 2017 National Defense Authorization Act (NDAA), “Backup and Complementary Positioning, Navigation and Timing Capabilities of Global Positioning System (GPS)”.

To meet ever-growing threats of both, natural and man-made environments, and evolving adversary countermeasures, there is a **need to PNT solutions that are not completely reliant on GPS**.

February 15, 2023

Accurate and reliable positioning and timing is critical to a variety of applications.

A few months ago, during GPS satellite maintenance, an incorrect time was accidentally uploaded to several GPS satellites, making them “out of sync” by the fractions of fractions of seconds.

The minute error disrupted GPS-dependent timing equipment around the world for more than 12 hours. In parts of the U.S and Canada, police, fire, and EMS radio equipment stopped functioning. BBC digital radio was out for two days in many areas, and the anomaly was even detected in electrical power grids.



As another example, in 2018, a joint forces unit was on a mission against a high-value target when they were ambushed and pinned down. When interviewed, the Joint Terminal Attack Controller (JTAC) said, “Because of the **tree cover**, the aircraft overhead couldn't see me or the target. I had to **continually leave the protection** of cover in order adjust the rounds.” Eventually the airstrikes were called in, allowing the unit to withdraw.

These are just a couple examples of where our solution for a more reliable Positioning, Navigation, and Timing (PNT) system NavX™

(formerly escPNT™) is highly beneficial and leads to **increased mission success and save lives!!**

2.0 esc Aerospace US, Inc.

esc Aerospace US, Inc. is a small product developer and systems integrator, with the depth of experience of a large corporation. Our size, low overhead, extensive solution partnerships and global reach enable us to meet the highest complexity technological challenges and meet our clients need with best value solutions.

We are focused on development of autonomous systems, applications for Artificial Intelligence (AI) and Machine Learning (ML), and delivery of highly accurate and resilient Positioning, Navigation, and Timing (PNT) solutions without dependency on GPS.



esc Aerospace US, Inc. has successfully delivered solutions across the US Department of Defense and commercial customers like Ford Motor Company. Our revenue comes from direct product sales, licensing, and services.

Our team has more than 60 years of experience across military and commercial markets and decades of experience with product development.

2.1 Legal Structure

esc Aerospace US, Inc. is a Florida C-Corporation and is a registered US Small Business Administration “US Owned and Controlled” small business. We are located in the UCF Business Incubator at Research Park in Orlando Florida. Located near the University of Central Florida campus, as well as key technology industry clusters, the Central Florida Research Park incubator predominantly serves emerging high-tech companies. This 48,000-square-foot facility features Class A office space with flexible leases, meeting and conference rooms, shared office equipment, plus space suitable for laboratories and early-stage manufacturing.

The owners of esc Aerospace US, Inc. are invested in two esc Aerospace companies in Europe (esc Aerospace GmbH and esc Aerospace sro). However, these companies are not affiliated with esc Aerospace US, Inc. We only share the brand name and collaborate through subcontract agreements.

EIN: 83-0932971

DUNS: 081266985

CAGE: 85SC5

SBC: 001596547

2.2 Key Personnel

The esc Aerospace US, Inc. team has the experience, dedication and passion to meet and exceed growth objectives. Strong business and technology acumen coupled with an extensive network of potential customers, suppliers, and partners minimize risk and enable success.

Lars Weimer – President & Chief Executive Officer

Lars has the German degree Dipl.-Ing. (equivalent to Master of Science) in Aviation and Aerospace Engineering. He is a highly experienced and dynamic aerospace manager, with vast background of skills and experience in research and leading technical and non-technical teams. He has driven the successful start and early growth phase of tech companies in the US and Europe. His professional experience includes UAS research and development projects with several commercial entities as well as the European Space Agency (ESA), USAF AFRL and US Army. Lars has more than 20 years of demonstrated achievements in all space and aviation system life cycle phases.



Danny Stirtz – Executive Vice President

Danny Stirtz has over 40 years of experience in systems development and commercialization. He has successfully launched a number of small businesses as well as worked at all levels of large and small organizations from individual contributor/programmer to senior staff positions at companies like Lockheed Martin, Hughes Aircraft Company, Northrop Electronics, GE Aerospace, and Beckman Instruments. He spent over 28 years at Lockheed Martin. His development experience has included Astro-Inertial Navigation Systems (SR-71), GPS space and ground segments, MILSTAR ground segment, Second TDRSS Ground Station (STGT), visualization/mapping systems (classified), and other related technology areas. Danny was awarded a BS in Computer Science from California State University of Fullerton in 1981.

Cantwell Carson – Senior System Engineer

Dr. Carson has worked on over 20 government-funded research and development projects in academia, national labs, and the private sector. His Ph.D. in Materials Science & Engineering was awarded from Georgia Institute of Technology in 2009. Cantwell was Principal Investigator for the AF182-002 "Satellite ID, Tracking, and Health for Position Navigation and Timing" contract where he developed a method of determining positions of LEO satellites for PNT. As Technical Lead of AF 1917 Small Business Innovation Research (SBIR) "Satellite Identification, Tracking, and Health" he developed a low cost, passive satellite tracking system based on RF signal time-of-flight, and Doppler shift.

Edward Seger – Senior FPGA Development Lead

Mr. Seger is a highly capable and experienced developer with over 20 years of experience in FPGA and hardware development. His experience includes development of the radio front-end/FPGA for the NavX™ LEO SOOP project with the Air Force. His experience design and development of next generation analog acquisition hardware, signal processing applications using FPGAs and microprocessors, multiplatform system test software suite development. His experience ranges across multiple recognized commercial developers as well as the NSA where he optimized signal processing software and invented a disk sanitizer capability to declassify disk drives for use outside the agency (received the Directors Productivity Improvement Award). Mr. Seger has a BS-EE from Capitol College, Laurel MD.

2.3 Ownership and Management

esc Aerospace US, Inc. was founded June 13th, 2018, by its three current shareholders. Their voting shares currently represent 80% of the total 10,000,000 shares of stock. The remaining 20% non-voting shares have been reserved for employee incentives and/or small investment. To date, ~1% of the reserved non-voting shares have been allocated for employee incentive.

Shareholders	% Voting	# Voting Shares	% Non-Voting	# Non-Voting Shares	Total Shares	% Total
Mathias Krueger	40%	3,200,000	0%	-	3,200,000	32.00%
Lars Weimer	30%	2,400,000	0%	-	2,400,000	24.00%
Danny Stirtz	30%	2,400,000	0%	-	2,400,000	24.00%
Reserve	0%	-	96%	1,928,000	1,928,000	19.28%
Employees/Investors	0%	-	4%	72,000	72,000	0.72%
Total	100%	8,000,000	100%	2,000,000	10,000,000	100%

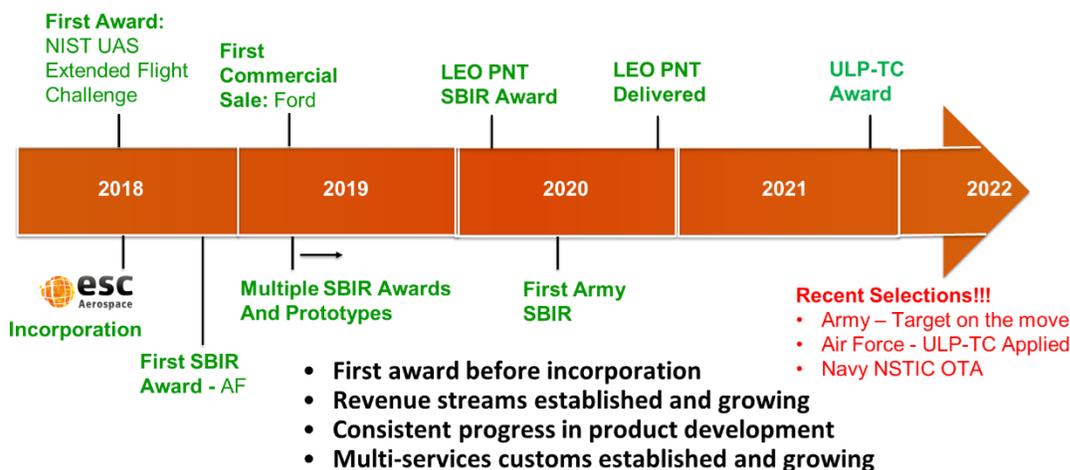
Board of Directors: Mathias Krueger, Lars Weimer, Danny Stirtz

Corporate Officers: (day to day operations): Lars Weimer, Danny Stirtz

Full resumes/CVs and corporate documents are available upon request.

2.4 History and Major Milestones

We have accomplished a lot in a short time. Established in 2018, we have leveraged our founder’s relationships to establish a strong network of customers, partners, and suppliers. We have won contracts across DOD services (Air Force, Army, SOCOM, Navy) and established relationships with major potential partners/customers (i.e. Lockheed Martin, Cubic, CACI, Ford Motor Company, etc.). These relationships position us for potential new business as well as support our exit strategy.



3.0 Markets and Business Strategy

esc Aerospace US, Inc. is a product developer and systems integrator. We strive to understand our client’s complex needs and integrate/deliver solutions to meet those needs. To maximize our success, we focus on the following strategies:

- 1) **Technology Focus:** We constantly evaluate technologies and markets for opportunities. Because of the existing market size and continued high growth potential (see Market and Commercialization section) we have strategically focused on **Unmanned Systems (Autonomous Systems), applied AI/ML** and specifically on **Guidance, Navigation, Control (GNC) and Positioning, Navigation, Timing (PNT) solutions.**

2) **Customer/Market Focus:** Although we sell to both commercial and defense markets, we have strategically focused on defense. Although the defense markets traditionally yield lower margins, the **US Department of Defense (DOD)** provides significant opportunity. Traditionally the DOD supports small businesses through set-asides, significant investment through SBIR and other programs, as well as small business objectives for larger prime contractors. Additionally, the National Defense Strategy specifically recognizes the importance of new technologies, e.g. autonomous systems, and encourages “increase agility, speed, and resiliency ... and deployment ... in order to stand ready to fight and win the next conflict.” The goal is to make the military more “lethal, agile, and resilient.” (the *National Defense Strategy* is classified, but the 10-page unclassified summary of this strategic guidance document is available on request).



What application would not benefit from reliable and accurate PNT in GPS denial?

3.1 Market Size

As part of the esc Aerospace Business Development process, we conducted a market analysis to analyze the market potential prior to investment of esc Aerospace Internal Research and Development funds. Additionally, as part of our first Department of Defense contract with the US Air Force AFRL (AF182-002 Innovative Position Navigation and Timing), an independent consultant was tasked by AFRL to develop a detailed market analysis. This analysis/report (**report available on request**) validated the market analysis already conducted by esc Aerospace.

In summary, all analysis shows tremendous growth potential and multibillion dollar market (i.e. “The global location-based services market was valued at: USD **20.53 billion** and is expected to reach USD 133.08 billion by 2023...”).

We have conducted analysis of the number of platforms in the US DOD only (excluding potential commercial and global defense markets). This analysis shows greater than **800,000** platforms that may benefit from an NavX™ system. This number is consistent with the published data regarding the Joint Tactical Radio System (JTRS) program that eventually will deploy over 750,000 tactical radios. The same platforms (and others) that would utilize a tactical radio

Platforms		
Army Active Duty	500,000	
Infantry	15%	75,000
Other field support	10%	50,000
SOCOM	70,000	
Tactical/support	50%	35,000
Ground Vehicles		500,000
Small UAS		11,000
Aircraft		15,000
Ships		10,000
		696,000
Spares	20%	139,200
Total		835,200

would also benefit from an NavX™ device. The program is budgeted ~\$6.8 billion to produce 180,000 (initial wave) radios, an average cost per radio of \$37,700. Grand View Research valued the **global artificial intelligence market size at USD 93.5 billion in 2021** and projected it to expand at a compound annual growth rate (CAGR) of 38.1% from 2022 to 2030.

4.0 Product Strategy

NavX™ is our current brand for our solution to resilient/accurate PNT in GPS challenged and denied environments. We are aggressively pursuing contracts to fund enhancement and accelerate market entry. **Our overall strategy:**

- Focus on **multi-sensor data fusion** that enables us to leverage any/all sources of positioning/timing information.
- No subscription required – zero dependence on signal content and service providers.
- Provide very low **Size, Weight, Power and Cost (SWaP-C)** product to enable market reach.
- Applications of AI/ML for increased accuracy and expanded capability.
- Advanced visual sensor technologies and applications of AI/ML provide additional PNT resiliency and expand product/solution reach to Intelligence, surveillance, and reconnaissance (ISR) markets.



Low SWaP-C enables us to meet growing market demand in markets that are currently very underserved, including sense and avoid for autonomous rovers (ground, air), construction site inspection, surveillance, military (dismounted, small UAS, precision weapons), autonomous ground vehicles as well as larger ground vehicles, aircraft, maritime applications, space applications, mission planning, search and rescue, border protection, pipeline/powerline inspection. Our go to market strategy is to start with those markets that would benefit most from low SWaP-C (i.e. small UAS and dismounted soldier) and grow into other markets (i.e. manned aircraft, maritime, etc.).

What applications/systems would NOT benefit from accurate position and time in GPS denial?

The low size, weight, power, and cost of our solution, combined with our unique technical features, discriminates our solution, and enables us to reach huge and growing markets.

Our go-to market strategy includes:

- Direct sales of product
- Software/technology licensing
- Integration services

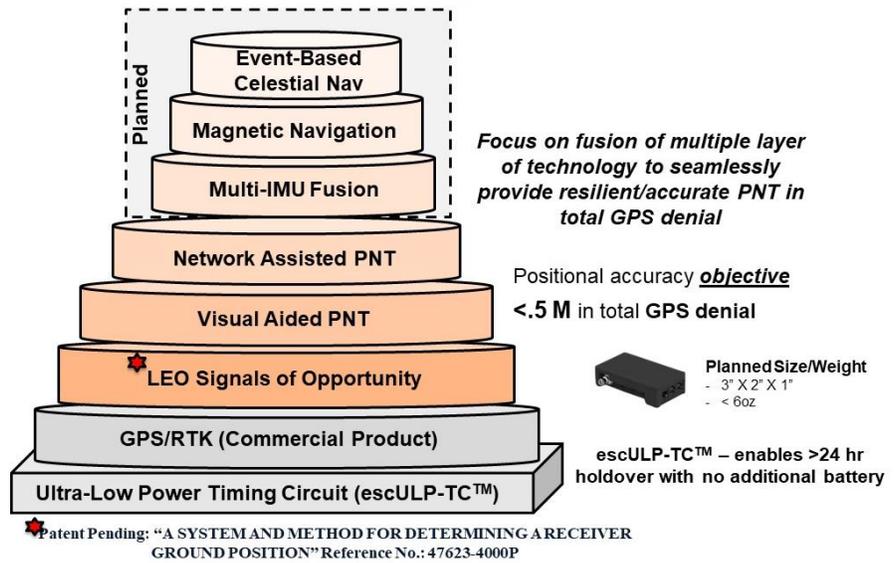
Software/Technology product licensing to channel partners will accelerate access to commercial markets and grow returns.

We continue to leverage DOD and other government agency small business initiatives to fund product development and have successfully delivered prototype systems to the Air Force and Army under SBIR contracts. Transition from these prototypes to operational systems requires additional investment but will yield exponential sales growth.

Our competitors (legacy military navigation, companies, and new market entrants for PNT in GPS denial) typically focus on a single technology – like vision systems, inertial systems, terrestrial transmitters, and others – to solve the problem of GPS denial. This tends to limit their utility across various use cases. **esc Aerospace US, Inc. focuses on integration of multiple sensors and technologies for applicability across a much larger set of uses. At the same time our solutions are low SWaP-C (Size, Weight, Power, Cost) and do not require any subscriptions or proprietary receiver hardware.** Additionally, our product is intended to be a “sub-system” to other systems and as such, will open other integration opportunities.

5.0 Our current products

Our robust NavX™ Product Roadmap has been designed to continuously add reliability, accuracy, and robustness for PNT in **TOTAL GPS denial** for our existing customers and to reach additional commercial and government markets.



We currently offer two primary products:

1. **NavX™** - low SWaP-C (Size, Weight, Power, Cost) device that provides reliability, accuracy, and robustness for PNT in **TOTAL GPS denial**
2. **escULP-TC™** – chip size Ultra-Low Power (ULP) Timing Circuit that bridges the gap between low-cost commercial oscillators (XO) and very high cost and power Chip Scale Atomic Clocks (CSAC).

5.1 NavX™

NavX™ is based on a commercially available GPS product with layers of capabilities added to provide resiliency and accuracy when GPS signals are unavailable or unreliable. Many competitive products tend to focus on one technology. This limits their ability to address application across a wide variety of applications.

We offer NavX™ as a standalone device, or as an embedded board. Some of the technology layers may also be licensed as software components.



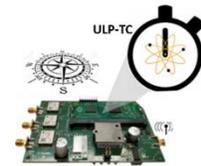
Layers of capability add resiliency, accuracy and ability to function in an extensive variety of applications



- **Target size**
 - 2 Inch
 - < 6 oz
- **Multi-SKU**
 - Feature/function
 - Military/commercial
 - Embedded/Standalone

The small size makes NavX™ applicable to large and growing markets, such as small Unmanned Aircraft Systems (UAS).

Our escULP-TC™ product is a component of NavX™ and enables our solution to provide continuous/accurate PNT when other solutions would fail over time.



5.1.1 GPS/RTK

The foundation of NavX™ is a commercially available product that provides a low SWaP-C solution for accurate position/time in GPS **challenged** environments. Low SWaP-C enable us to meet growing market demand in markets that are currently very underserved including small UAS, personal (tactical-level airmen), small ground autonomous vehicles, precision weapons, and many more. Our solution is also applicable to other markets that currently utilize much larger, heavier, greater power consumption and expensive devices such as larger manned aircraft and maritime application (commercial and military). At the core of NavX™ is our tightly coupled sensor fusion algorithm that fuses a wide variety of information to produce an accurate and reliable position. This includes 3 Global Navigation Satellite System (GNSS) receivers, Inertial Measurement Unit, crystal clock, barometer, and temperature sensor. Multiple standard interfaces enable access to other sensors and sources of information.



By utilizing multiple sources of information, we provide a resilient centimeter accurate PNT in GPS/GNSS "challenged" environments (where GPS and other GNSS satellite signals may be unreliable due to weather conditions, RF signal noise, signal reflections off buildings, obstructed by trees/buildings, etc.) for some short time (1-5 minutes).

Real-time kinematic (RTK) corrections are applied to enable positional accuracy to 2 centimeters!!

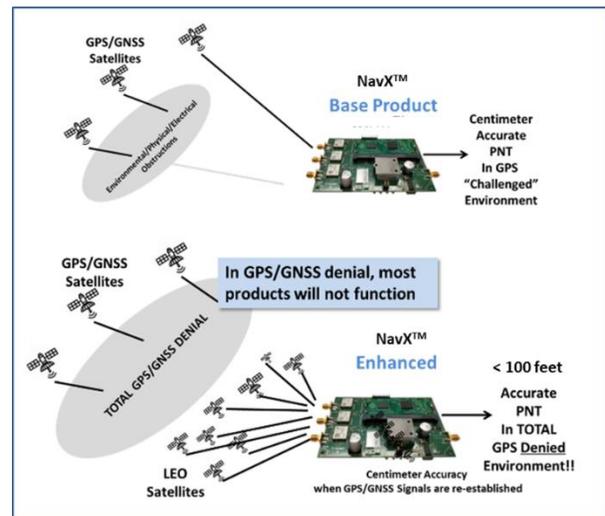
5.1.2 Low Earth Orbit (LEO) Signals of Opportunity (SoOP)

The airways are full of Radio Frequency (RF) signals that were not necessarily intended for positioning. Our solution has been designed and developed to be flexible/configurable to leverage many of these RF "Signals of Opportunity" (SoOP) as positioning information.

In September 2020 we successfully delivered a proof-of-concept operational prototype to US Air Force Lifecycle Management Center (AFLCMC). This prototype added the use of signals from non-positioning **Low Earth Orbit (LEO) satellite** as a source of positioning. We were able to calculate position data based on LEO satellite signals only and visualize the position on military systems (Android Team Awareness Kit - ATAK). Our customer declared our proof-of-concept **"very successful."** **A 100 sec video may be viewed at:**

<https://youtu.be/RNqHAtszjsl>

Being at a much lower orbit than GPS satellites, LEO satellite signals are much stronger and reliable. There are currently hundreds of LEO satellites broadcasting over a much wider spectrum of frequencies which makes them far **more difficult to spoof or jam**. In the next few years, it is anticipated that mega-constellations such as Space-X's Starlink will be launched, making **thousands**



of new satellites available for positioning information.

By adding the use of other signal sources, like LEO satellite signals, we can literally assure signal availability and PNT in GPS denied environments. Unlike other competitive products, our solution does NOT rely on signal content and is NOT reliant on costly receivers/services (i.e. GlobalStar, Iridium).

Patent Pending: “A SYSTEM AND METHOD FOR DETERMINING A RECEIVER GROUND POSITION” – (PCT/US2021/037443).

5.1.3 Visual Aided PNT

esc Aerospace successfully completed an SBIR Phase 1 contract for adding Visual and Visual Inertial Data to our NavXTM. This provides enhancements to our current NavXTM, to enable Enhanced Visual Odometry for accurate PNT in GPS denial as well as utilization of **AI/ML applied to visual imagery** enhanced situational awareness (Real-Time 3D terrain mapping, AI for object ID, etc.).

esc Visual Aided PNT and Enhanced Situational Awareness



Low SWaP-C Visual Aided PNT in total GPS denial

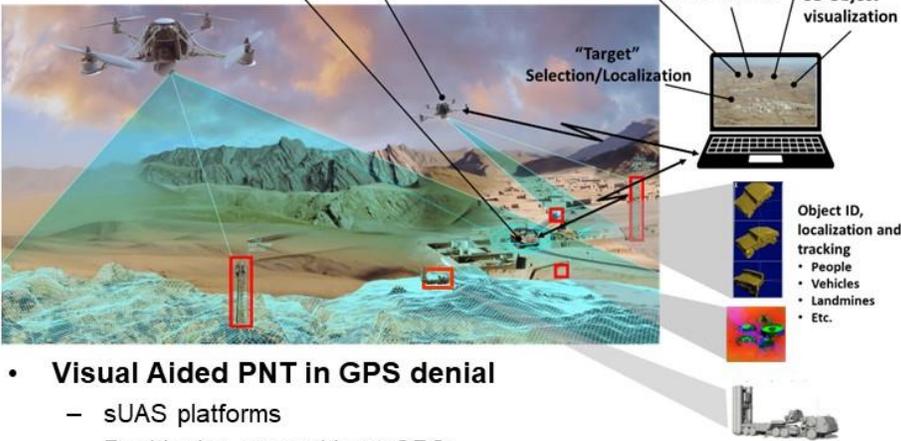
- Standard Architecture for “Plug and Play” PNT
- Platform independent (Ground Vehicle, sUAS, etc.)

3D map generation from live image feed

Change Identification

Image enhancement

3D Object visualization



Visual Aided PNT in GPS denial

- sUAS platforms
- Positioning error without GPS:

Enhanced Situational Awareness

- Real-Time 3D terrain map (sUAS)
- Object identification/ranging/tracking

Proof of Concept Prototype

5.1.4 Network Assisted PNT

Unlike prior research that focused on a “base-station,” our approach that was developed in an US Army SBIR Phase 1 project, is based on the concept that each node in the network of nodes (for example a group of warfighters) has the ability to act a “base-station.” That is, at least one node in the network will have a “trusted” PNT (accurate and reliable) time/position. All other nodes in the network will be “synchronized” to that Trusted Node with the help of our in-house Remote Synchronization Protocol (RSP), thereby enabling all nodes in the network to maintain accurate position/time in TOTAL GPS denial.

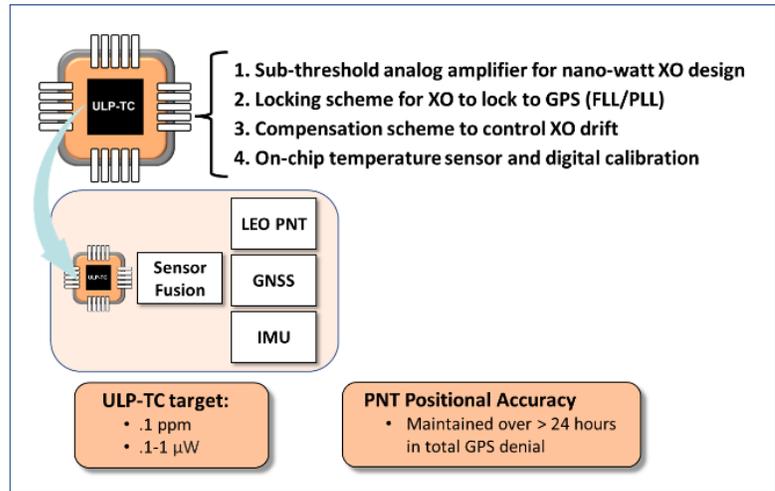
5.1.5 Event Based Sensor Assisted PNT (example future enhancement)

Traditional camera sensors are limited in dynamic movement environments resulting in motion blur and high latency. There is an evolving new sensor technology available, Event-Based Cameras. These cameras capture changes in pixel brightness only (compared whole frame). They output - timestamp, spatial coordinate, and brightness changes only which results in a significant reduction in data gathered, high temporal resolution,

sub-millisecond latency and a higher dynamic range. Use of Event-Based Cameras as an alternate source of visual data, our Visual Enhanced PNT opens our solution up to applications where traditional image technologies struggle (i.e. low light/high time, tracking of fast-moving objects, etc.).

5.2 escULP-TC™

It is sometimes forgotten that the “T” in PNT stands for “TIME” and many systems rely on GPS for accurate time. Current PNT solutions leverage internal clocks/oscillators to maintain time when GPS signals are unavailable. However, the lower SWaP-C clocks/oscillators tend to “drift” over short periods of time (minutes). This is acceptable when GPS is “challenged”/spotty due to obstructions (urban canyons, tree cover, etc.) but is totally unacceptable when GPS is denied for hours or days. One solution to this



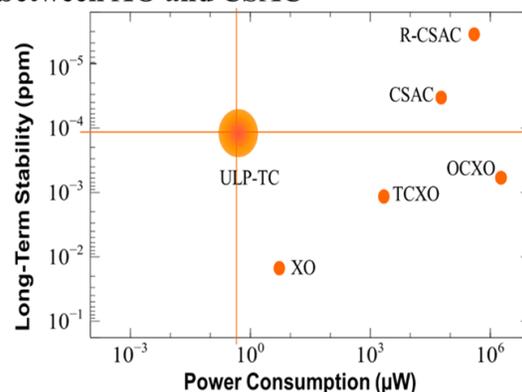
ULP-TC Performance in Perspective

	escULP-TC™	EPSON	EPSON	Q-tech	Microsemi	Orolia
Technology	Low power compensated XO	XO	TCXO	OXCXO	CSAC	Rubidium CSAC
Part/Model	In Development	TG-3541CE	TG2016SMN	QT410	SA.45s	mRO-50
Power Consumption	<1 uW, <.001 mW	9 uW, .009 mW	4500 uW, 4.5 mW	2700000 uW, 2700 mW	120000 uW, 120 mW	450000 uW, 450 mW
Supply Voltage	0.9 to 1.2 V	3 to 5 V	1.8 to 3.3 V	3.3 to 15 V	3.3 V	3.3 V or 5 V
Stability - Short term /1000s	<1 ppb	Not provided	Not provided	Not provided	0.01 ppb	Not provided
Stability - Long term /day	<0.1 ppb	27 ppb	1.3 ppb	1 ppb	<0.03 ppb	0.005 ppb
Hold-over time drift	~10 us/hour	Not Applicable	Not Applicable	Not Applicable	Not Applicable	1 us/hour
Temperature Range	-20 to 85 C	-40 to 105 C	-40 to 85 C	-20 to 70 C	-10 to 70 C	-10 to 65 C
Stability over temp. range	<0.1 ppm	16 ppm	1 ppm	0.2 ppm	1 ppb	1 ppb
Warm-up/Start-up Time	<1 s	3 s	2 ms	10 min.	180 s	30 s
Size	3.2 x 2.5 x 1.0 mm	3.2 x 2.5 x 1.0 mm	2.0 x 1.6 x 0.73 mm	45.8 x 64.8 x 39.4 mm	40 x 35.3 x 11.43 mm	50.8 x 50.8 x 19.5mm
Weight	.024 g	.024 g	Not provided	175 g	35 g	Not provided

*Relative to nominal frequency.

escULP-TC™ bridges the gap between XO and CSAC

- Increased power consumption has a **DIRECT** impact on **battery** powered applications
- CSAC in support of mobile platforms (sUAS, dismantled, precision weapons, etc.) drives significant additional battery weight
- Current low power **XO not sufficient** for many mobile applications (i.e. PNT)
- Time errors have direct correlation to positional error in PNT application
- With current oscillators (10 ppm), unacceptable positional error in <10 min
- **Analysis shows 0.1 ppm could extend positional accuracy in total GPS denial to > 24 hr**



problem is use of Chip Scale Atomic Clocks (CSAC). The problem is current technology CSACs are high power consumers. For mobile applications (i.e. small UAS, precision weapons, handheld radios, etc.), this drives the need for additional power/batteries.

esc Aerospace has partnered with researchers at Northeastern University to create an affordable Ultra-Low Power (ULP) Timing Circuit (escULP-TC™) that bridges the gap between low SWaP-C commercial oscillators (XO) and very high SWaP-C CSACs. Our new escULP-TC™ will enable **significant positional accuracy**

Ultra-Low Power Timing Circuit (escULP-TC™)



- **Timing circuits ubiquitous**
 - time maintenance “in-between” GPS signals (a few sec.)
- **Many systems will fail when GPS absent for > a few seconds/minutes**
- **Current higher performance timing devices**
 - expensive
 - consume large amounts of power
- **ULP-TC target spec**
 - .1 ppm performance
 - .1-1 μW power
- **Used in escPNT™ and sold as separate product**
 - Positional accuracy maintained over >24 hr in total GPS denial

escULP-TC™ bridges the gap between low cost/power timing circuits (crystal oscillators - XO) and high-performance timing circuits (i.e. Chip Scale Atomic Clocks - CSAC)

improvements of our NavX™ and enable utilization in total GPS denial without positional/time “drift.” **The market potential for escULP-TC™ by itself is significant, especially in the emerging field of the Internet-of-Things (IoT).** The first batch of chips exceeded our expectation already, while currently a second batch, improved batch of chips is in manufacturing. We are currently under Air Force contract to study the integration of our ULP-TC™ into Air Force systems.

6.0 Example Relationships - Customers, Stakeholders, Users

The following are **some examples** of “Champions” for our company/technology:

- **Ray Heath, Lead Special Warfare Requirements, US Air Force AFSOC, HQ A5-8-9/A5K** - supported our SBIR Phase 2 LEO PNT project by signing a Memorandum of Understanding (a prerequisite for contract award).
- **Paul Olson, Chief Engineer – US Army Combat Capabilities Development Command (CCDC), Army Futures Command, Positioning, Navigation and Timing Division, Command, Power & Integration Directorate – Direct customer for Network Assisted PNT.** Paul continues to be an esc Aerospace “champion” and has provided numerous Letters of Support (LoS) for our SBIR proposals. He also signed our Air Force MoU for our Visual Aided PNT Phase II SBIR.
- **Sanford (Luke) Steelman III, US Navy Naval Surface Warfare Center VA (USA)** - is currently working with us to obtain funding for our SOOP capability. Luke and his team have been working on a SOOP PNT solution for years. **He has reviewed our solution and believes we have a unique approach that will enable field configuration of our PNT device to utilize a wide spectrum of RF SOOP without hardware/software field upgrades. This will provide significant cost savings and reduced technical risk.** We are currently working with him to define 2022 scope/budget for a sole-source award project.
- **Paul Fleitz, Air Launched Off-Board Operations (ALOBO) Team Lead US Air Force, AFRL/RQQC** – actively supports our Visual Aided PNT activities and provided a signed MOU in support of our Visual Aided PNT and Ultra-Low Power Timing Circuit (ULP-TC) Phase II proposals. Paul is US Air Force Customer and End User in our on-going ULP-TC Phase 2 contract.
- **Mark Smarcheck, Senior Electronics Engineer, Navigation and Communication Branch, Air Force Research Laboratory, Sensors Directorate** – Mark is the Air Force representative to PM-PNT

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(cross services organization intended to share information/technologies relative to PNT). He has been a significant champion and has provided multiple LoS and introductions throughout the DOD.

- **Dr. Stephen J. Lee, Ph.D., Chief Scientist (SES-ST) – US Army, U.S. Army Research Laboratory (ARL)**, U.S. Army Research Office, Office of the Director - The laboratory will support NavX™ PoC testing support. Actively supporting identification of potential funding opportunities.
- **Michael Sedillo, BATMAN PM – USAF Sensory System’s branch, 711th Human Performance Wing** - Provide test/exercise support in several use cases. We will work closely with the BATMAN to identify other applications/use cases. The team is also actively supporting potential funding for an SBIR Phase II Enhancement Project.
- **Maj. John Beilstein, Chief of Test - USAF AFMC 661 AESS/WIJ-661 AESS** - Provide subject matter expertise and extensive operational and testing lessons learned will be provided.
- **Bon Strout, SERE – Air Force, AFSOC** - Technical Point of Contact (TPOC) for our project “Smart Streamer”.
- **Richard J. Benney, Director - Army Combat Capabilities Development Command - Soldier Center (CCDC-SC)**, Aerial Delivery Directorate - CCDC-SC will provide an airdrop vehicle upon which our enhanced system may be tested to characterize its response to the cargo airdrop environment. CCDC-SC will utilize existing GPS sensors during system flight and compare with data measured by the enhanced NavX™ product, to ascertain its accuracy and utility for air drop application.
- **Benjamin Johnis, PM, Personnel Recovery - U.S. Special Operations Command Central (SOCCENT)** - Mr. Johnis has been actively supporting esc Aerospace since 2018 when he interviewed as part of our Customer Discovery process for our AFRL “Special Topic” SBIR AF182-002 Innovative Position Navigation and Timing. For our Phase 2 project he provided advice and actively supported identification of potential funding for a Phase 2 Enhancement project.

A sample of our industry partnerships include:

- **Lockheed Martin RMS – LM Rotary and Mission Systems (RMS)** – Provided numerous LoS, included esc Aerospace as teammate on US DOT PNT opportunity. esc Aerospace included LM RMS as teammate on C5 OTA Soldier Integrated PNT proposal. LM RMS is also actively supporting sponsorship of esc Aerospace Secret Facility Clearance.
- **Cubic** - Cubic has agreed to allow esc Aerospace to utilize their facility in Orlando as needed to support our PNT efforts (SECRET facility clearance). We continue to investigate the potential of integration of NavX™ with Cubic products and to build our strategic relationship.
- **Aironge** – Design and manufacturing of automatically navigated and flown manned and unmanned airplanes designed for dirty, dull and dangerous aerial missions - Integration of NavX™ with Aironge avionics/autopilot with test/evaluation in actual flight. Aironge will also analyze NavX™ for flight certification efforts to be proposed in subsequent projects.

7.0 Intellectual Property

We consider the design/implementation of our NavX™ product line to be a **Trade Secret**. All esc Aerospace staff, partners and subcontractor/suppliers have and will sign Non-Disclosure Agreements (NDA). All intellectual property is rigorously controlled and labeled.

A **patent** related to our unique method of using LEO satellite signals for PNT has been filed: “A SYSTEM AND METHOD FOR DETERMINING A RECEIVER GROUND POSITION” – (PCT/US2021/037443).

We have **trademarked the brand, NavX™** (not registered). Before significant production begins, we plan to conduct a more rigorous branding strategy and potentially select a different brand.

8.0 Competition

esc Aerospace's competitive landscape includes:

Small GPS receiver companies:

Product: low cost, low accuracy, product that does NOT function well in GPS challenged environments and does NOT work at all in GPS denied environments

Example: Garmin, TomTom, Here, etc.

Competitive risk (LOW): Will not meet need for accurate PNT in GPS challenged/denied environment. Small overlap in addressable market

Legacy military navigation companies:

Product: Heavy, large, high power and expensive devices typically for large vehicles (aircraft, ground vehicles, maritime)

Example: Northrop, Lockheed Martin, Rockwell

Competitive risk (Moderate): Will tend to continue to focus on adding resiliency for GPS denial to existing product. May reduce SWaP but will probably continue to address the larger vehicle markets. They are a potential "partner" if we can find a way to integrate/license our technology to them, re-brand or resell our product.

Newer technology GPS/Navigation companies:

Product: Low SWaP products. Market segment overlap. Ability to meet accuracy needs in GPS "challenged" environments. Similar approach utilizing multi-sensor fusion.

Example: Novatel, Trimble, etc.

Competitive risk (High): Currently NOT addressing need to PNT in total denial or offering vendor specific solutions. Products are 2X larger/heavier, and 50% higher price.

New market entrants for PNT in GPS denial utilizing LEO

Product: Mid SWaP. Moderate price PNT solution. Each product utilizes a single LEO satellite constellation

Example: GlobalStar/Echordge (uses GlobalStar), "AltPNT" (classified), Satelles/Iridium

Competitive risk (High): Seem to be addressing larger vehicle and/or dismounted/hand-held markets. Advertised accuracy 10-30 meters. Lower SWaP, lower price, better performance and constellation/vendor agnostic yields NavX™ a competitive advantage.

9.0 Sales and Financial Strategy

Our growth strategy is to grow "organically" and be open to "opportunistic" investment to accelerate growth.

Investment revenue could accelerate growth.

Implementation of this strategy is through DOD contracts, primarily SBIR projects. Other sources of revenue are product sales and commercial contract work (i.e. Ford Motor Company Proof of Concept, etc.) and IR&D.

Our strategy for product sales is anticipated to come from:

- 1) Leverage of SBIR projects for non-dilutive funding of product development
- 2) Product sales
- 3) Software licensing
- 4) Annual product support/maintenance fees
- 5) Integration services



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Our sales strategy is both direct and indirect. We are pursuing direct sales to government and commercial customers. However, since our product is an “embedded system” we are also pursuing sales to “platform” manufacturers (i.e. small UAS, autonomous vehicle manufacturers, etc.), service providers (i.e. mapping/survey, disaster recovery, insurance/claims, inspections/maintenance, etc.), channel partners (i.e. systems integrators (like Lockheed Martin), etc.).

Our customer pipeline has over 400 current potential customers in all these areas and growing. We anticipate year over year growth as markets mature, and early adopter customers roll out NavX™ through various applications/platforms.

The company was formed with a very small loan from the current shareholders and has grown organically since. Operations/development inception-to-date have been funded through contract/product sales. Our revenue objectives are shown below.

Cash Flow and Profit	2020	2021	2022	2023	2024	2025	2026	2027
Revenue	\$ 767,502	\$ 592,711	\$ 689,590	\$ 3,723,571	\$ 7,131,524	\$ 16,132,800	\$ 62,743,020	\$ 149,329,056
Cost	\$ 703,538	\$ 625,156	\$ 719,928	\$ 5,868,520	\$ 12,013,007	\$ 15,045,000	\$ 27,023,111	\$ 45,286,813
EBIT / "Net Income"	\$ 63,964	\$ (32,445)	\$ (30,338)	\$ (2,144,949)	\$ (4,881,483)	\$ 1,087,800	\$ 35,719,909	\$ 104,042,243
Shareholder loans (annual)	\$ 81,927	\$ (107,709)	\$ (75,000)	\$ (71,782)				
Investment	\$ -	\$ -		\$ 2,000,000	\$ 5,000,000		Series A	
Total cash	\$ (17,963)	\$ 75,264	\$ 44,662	\$ (73,167)	\$ 118,517	\$ 1,087,800	\$ 35,719,909	\$ 104,042,243
Reserve	\$ 0	\$ 75,264	\$ 119,925	\$ 46,759	\$ 165,276	\$ 1,253,076	\$ 36,972,985	\$ 141,015,228
Liabilities	\$ 63,280	\$ 146,782	\$ 71,782	\$ -	\$ -	\$ -	\$ -	\$ -

The revenue projections are based: on a market analysis and conservative assumptions for our share of the market; potential product sales, maintenance fees and integration services; analysis of DOD projects and probability of win.

\$7M ask may be funded incrementally. The projections above are based on anticipated funding over 2 years. “Series A” in 2026 is a projection of the next potential funding event.

Detailed financial analysis is available on request (reviewed financials through 2021).

10.0 Potential Capital Raise and Use of Funds

Securities: Convertible Promissory Notes

Amount: up to \$7,000,000

Purchase Price: Face Value

Interest Rate: Annual interest rate of 7%, payable at maturity

Minimum Investment: \$10,000.00

Maturity Date: Four (4) years

Discount Rate (Upon Conversion):

- Less than \$100,000: 10%
- \$100,000 up to \$1,000,000: 20%
- \$1,000,000 or more: 25%

Our current capital raise is governed under SEC filing and is available on request.

[Visit the esc Aerospace Investment Portal for more detail and to potentially invest.](#)

Future funding rounds are anticipated.

See NOTE regarding forward looking statement.

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In general, a capital raise would be used to accelerate our grow. Funds would be used in these areas:

- Staffing: our revenue flow from the DOD is sensitive to DOD notoriously slow procurement cycles and payments making cash flow management problematic and limiting our ability to hire key full-time staff. We manage our cash flow diligently. One mechanism we utilize is use of part-time contract labor. With additional capital, we could add additional full-time employees, accelerate our IR&D efforts, and pursuit and win more business. Potential staff includes: Lead engineers, Business Development, Hardware and Software engineers.
- Accelerated product Development: Acceleration of product development will enable us to win more business in DOD markets as well as enable us to accelerate sales to commercial markets.
- Marketing/Product Management: Sales into the commercial market will require the development and execution of a robust Product Plan that will include marketing/branding, go-to-market strategy development, channel development/management, product support, etc.

Ability to multiply investment - Supplemental Funding Pilot Program (TACFI and STRATFI)

The DOD has provided us with a unique opportunity to leverage external investment through the Supplemental Funding Pilot Program (TACFI and STRATFI). The purpose of this pilot program is to catalyze the relationships between Air Force and Space Force end-users and acquisition professionals, private-sector innovators, and the investment community and to bridge the capability gap between current SBIR/STTR Phase II efforts and Phase III scaling efforts, facilitating delivery of strategic capabilities for the Department of the Air Force.

The pilot program provides “matching” SBIR funds to other “investments” (from investment community and/or any other government entity). The maximum funding levels are:

TACFI: \$375,000 to \$1,700,000 (Air Force Matching)

- 1:1 Matching
- For every \$1 of investment, AF matches \$1 up to \$1.7M
- Minimum investment \$375K

STRATFI: \$3,000,000 to \$15,000,000 (Air Force Matching)

- 1:2 Matching
- For every \$1 of investment, AF matches \$.5 up to \$15M
- Minimum investment \$6M

Examples:

TACFI “Minimum” Example

- Investment: \$375K
- Match: \$375K
- Total: \$750K

STRATFI “Minimum” Example:

- Investment: \$6M
- Match: \$3M
- Total: \$9M

This is a competitive program with solicitation once per calendar year, typically starting in January. External funds need to be committed prior to award.

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Ability to multiply investment – Air Force Ventures Commercial Solutions Opening (CSO)

The Air Force (through AF Ventures) has implemented a special version of the Small Business Innovation Research (SBIR) program. We have been successful in winning a number of these projects specifically aimed at building the Defense Industrial Base (DIB) and promoting the growth of small business.

As part of the evaluation of an award the AF evaluates the offeror's "Commercialization Strategy." To ensure success of the small business, the DOD seeks to invest in companies/technologies that exhibit compelling demand signals. This may be evidenced through a strong Commercialization Strategy description, but the highest evaluation comes from other organizations that are willing to "invest" alongside the SBIR funding. This investment may come from other DOD program funding or external investment. A typical award is \$750K.

11.0 Exit Strategy

- **Time frame for exit:** The current owners of esc Aerospace US, Inc. plan to exit in approximately 5 years (2028).
- **Form of exit:** It is anticipated that the exit may be in the form of majority or complete ownership sale, and/or sale of specific technology like NavX™ and/or ULP-TC. The current Corporate Officers are open to potential on-going employment in support of the new ownership.
- **Potential Buyers:** We anticipate potential buyers to be:
 - Other larger product companies in the Guidance Navigation and Control (GNC) space (e.g. NOVATEL, Trimble, etc.)
 - Large government contractors (e.g. Northrop Grumman, Lockheed Martin, etc.)
 - Portfolio investment companies (potentially as "add-on" to existing company)

We have already been building relationships with many potential buyers as teaming partners, and suppliers.

12.0 Notes

From today's consumer perspective, unreliable GPS is an inconvenience. From a critical infrastructure, military application, and evolving autonomous systems, an alternative to GPS is CRITICAL

- Executive Order 13905, Strengthening National Resilience through Responsible Use of Position, Navigation, and Timing Services, 12 February 2020.
- Presidential Policy Directive 21 (PPD-21), titled Critical Infrastructure Security and Resilience, identifies 16 critical infrastructure sectors that are so vital to the United States that their incapacity or destruction would have a debilitating effect on national security, the economy, public health or safety, or any combination thereof.
- <https://www.whitehouse.gov/presidential-actions/memorandum-space-policy-directive-7>
- <https://www.congress.gov/bill/115th-congress/house-bill/2810>
- Included in the Frank LoBiondo Coast Guard Authorization Act of 2018, <https://www.congress.gov/bill/115th-congress/senate-bill/140>
- <https://www.federalregister.gov/documents/2020/02/18/2020-03337/strengthening-national-resiliencethrough-responsible-use-of-positioning-navigation-and-timing>
- 2017 National Defense Authorization Act (NDAA), Section 1618: requires "Backup and Complementary Positioning, Navigation and Timing Capabilities of the Global Positioning System (GPS).
- 2018 National Timing Resilience and Security Act: requires DOT to establish a terrestrial timing system to backup GPS
- 2019, Congress appropriated money for a GPS Backup Technology Demonstration
- 2020 NDAA Requires Air Force to develop a prototype multi-GNSS receiver as part of its resiliency efforts
- 2021 NDAA, Section 1601: SASC has ordered the Pentagon to provide Combatant Commander's alternate PNT within 2 yr

In the news

- Truck driver has GPS jammer, accidentally jams Newark airport
 - <https://www.cnet.com/culture/truck-driver-has-gps-jammer-accidentally-jams-newark-airport/>
- GPS interference caused the FAA to reroute Texas air traffic. Experts stumped
 - <https://arstechnica.com/information-technology/2022/10/cause-is-unknown-for-mysterious-gps-outage-that-rerouted-texas-air-traffic/>