

JATF Autonomous Warfare Proving Ground CE	
Current Limitations	Ways to Overcome
BLACK	
EW/FR Spectrum Limitiations - Facility Induced - 7.11 approval @ Stennis?	Process and NASA Problem. Multi-agency process. Set up pre-planned events with approved spectrum constraints.
RF Bands currently listed as restricted are most used	What are the alternatives, locations and ranges? Operator to Operator agreements.
Time limitations for getting frequency approval	See above pre-planned events. Need Congressional Support for expediting spectrum approvals.
Time limitations for getting air space approval	Consider what can be auto-approved (airspace and simple UAS configurations), vs what needs explicit approval.
Best space for testing = rural = less access to RND Talent	Not sure if this is an actual restraint in the academic space.
Jamming Permissions?	Similar to above
Contanerized Testing HALT anechoic chambers / for prototype testing	Build a requirement for the chamber to support laboratory testing of new or modified UxS before integrating into test ranges.
Day/Night air approval - which org controls the airspace - Navy/Stennis	Dilineate responsibiltiies
Limited shared access to expensive assets for startups	Build in incentives for participation (large and small industrial partners). Teaming agreements. Does AWPG validate that systems work? Success Memos? (big incentive)
lack of RF/tempest approved testing areas especially early in DEV stage	This should be part of the plan
FAA permissions for CUAS testing?	Airspace Deconfliction. Issue for MS/Congressional leadership
Kenetic testing against drones @ stennis - permissions needed for approval	Addressed by other solutions.
Bridging communications between local installations	Establish a Regional Range Coordination Center.
expense for going kenetic against UAS	Budget for C-UAS expenses - NDAA.
restrictions crossing between ranges or sites	Similar Coordination Center + established physical (air,sea, ground) corridors.
Stennis co location to airports - could be problem for GPS jamming? 60-120 days?	MS Government / FAA issue to address - policy and technical issues
Power/wattage restrictions for jamming?	
GPS/GNS/All constallatin Jamming - need to be able to test all to acheive true MDO testing and training	748th Air Force does this.
Range hosting a permanent red cell to test experimental UAS	Joint Red Cell - Budget and Manning. What Capabilities does hte Red Cell need to have? PED, EW, C-UAS, etc. Define the requirement.
Access to data on red/enemy RF signatures (signals of interest) for dev/testing	Range should be a Data-rich, Digital Twin-like Joint Simulated Environment (i.e. whats at Nellis)
UXO clearing on impact ranges after testing/training	Build in the requirement, will be needed. Huge Environmental Concern (not just ordnance, but hazmat, plastic, electronics, fuel, batteries, fiber-optic wire etc...)
	For all of the above - funding to support the requirements
BLUE	

Prox to facilities to repair / service	Build the required infrastructure on site
GPS denied test (spectrum access)	SME support to plan and deconflict test events. Establish EMI isolation area. Requires policy experts. "top golf" faraday cage
Kinetic charges in SUAS/FPV	Policy changes or waivers, Approvals for larger kinetic effects. Air worthiness release - Does NASA comply with DoW policy change?
RF power output considerations?	Early coordination with FAA and other local, state, and Federal orgs. Establish RF specifice corridors, areas
HF jamming - power amplification	
Barrage jamming?	
Data consolidation - strict timings for serials / mission sets / COP	Need an dedicated government team to collect, analyze, control and disseminate data
Analytics for payloads/models/spectrum	Identify and select a common framework, standard, application, etc. for post test analysis
Local airport impacts?	Coordination with FAA. Part of certificate of approval (COA)
Currently dont have have ability to run capability demos across sites? JOC?	Establish a Range Control Center (RCC). Would require range infrastructure to connect the range for data transfer, safety requirements, FTS, etc.
Maritime staging facility? How do we communicate with this?	Should be integrated into test infrastructure and comms network.
Spectrum flexibility - how do we switch quickly based on the live test environment?	Policy or technology issue requires different "fixes". Organic LTE network
Inability to pass data between sites. Different comms bearers	Requires intergrated range infrastructure.
Analytics - high level of compute required. GPUs/analysts	If on-site compute required then consider H/W purchase early due to market dynamics and long lead items For cloud, more resources = more funding.
What is the ultimate capacity for uas swarms delivering kinetic effects across multiple domains and training areas	POLICY!
Kinetic kill surface and sub surface?	POLICY!
target replication and emulation	Physical and synthetic (LVC) infrastructure
support from external orgs - intel, ew,	Different support and coordination required for different mission sets - offensive vs. defensive
ramp space limitations	Build the Infastructure
policy constraints for awrs	POLICY!
T&E integration, planning, support,	Create a dedicated, government led T&E team
Lesson's learned collection, RDT&E feedback loop	Elimate the information silos across joint and federal
Integrated DT and OT	T&E Team
Multiple org "own" ranges, airspace, etc. impacts timelines, coordination,e tc. Unity of command.	Unity of command. Refer to LI 25
Test infastructure ... radar, optical, EW, telemetry,	Baseline dispersed T&E infrastructure across mutiple range enviroments and then build it
Unified database of UXX kinematics, capabilities, TTPs, etc.	Establish one at the appropriate level at DoW
physical security, OPSEC classification	established standards are in place.

terrain limitation. need more operationally relevant environment	if alternative site isn't an option, then LVC
partner nation participation	Not an issue.
academia plug in and support technology transfer and experimentation	
GREEN	
Drone forensic and exploitation	NDAA compliance/vetting; DCMA/DIU credentialing
FCC FAA Domestic Restrictions (Industry)	Embed FAA/FCC representatives (continuity team - all stakeholder/regulatory bodies)
Non Federal Range Access (Lower Barrier to entry for simulation and physical access)	Develop partnerships with other ranges (commercial/academic/gov't); establish MOUs
Facilities Increase surge capacity	Develop partnerships with other ranges (commercial/academic/gov't); establish MOUs
Spectrum Capacity and management (ECM)	Embed spectrum manager on continuity team, include all stakeholders; standardized spectrum requests (automatic/reoccurring) - agile test/assessments
Data Transport, Long-Distance / Strategic C2	system-specific
Air Corridor Range Limitations	Clear definitions of range limitations
USV/UUV Corridor Range / Condition Limitations	Partner/establish satellite ranges with more operationally relevant conditions (open ocean/variable sea states/littoral regions)
Altitude restrictions for air and space (HAB)	Work with FAA/USSF/laser clearing house to own entire vertical air space up to 50k ft +
Drone Swarm Limitations (Autonomous Flight)	CONOP dependent, geofencing
Explosive Testing (NEW) (ESAD Certification)	direct line with ATEC/SOCOM/ESAD; access to engineers with safety release authorities
Target Replication and emulation	more funding
Event Life Support	full-time support/in contract
Environmental safety concerns	environmental stakeholder embedded; CATEX exclusion
Highly restrictive installation access requirements - especially for non-US persons.	plan ahead, establish clear requirements/processes
Long lead approval timelines for spectrum, access, range reservation, etc.	build processes/systems to improve efficiencies
Restrictive security clearance and escort requirements - burdensome for startups and small business	will be project dependent
Lack of UXS storage and maintenance space	site survey to identify potential facility expansion
UxV launch, recover, maintenance, and adjustment infrastructure.	develop universal L&R platforms, establish on-site facilities with machining/fabrication/retrofit capabilities
Inadequate USV, UUV Washdown Facilities	site survey to identify potential facility expansion
General lack of facilities and consumable supply infrastructure support. Fuel, shore power, etc.	Facilities planning committee to engage stakeholders and define infrastructure requirements
Lack of contract vehicles to route funding to support T&E services.	OTAs, nest accounts

Need system to appropriately disseminate test data and results post evaluation.	common data repository
Lack of mechanism to get regional stakeholders to set EM spectrum deconfliction policies conducive to permissive T&E. Should be nuanced based on range and power output.	Embed FCC representatives
ORANGE	
Airworthiness release, safety release requirements - not fast enough	Modify policy to replicate commercial design/testing concepts. Appetite seems to be there for this...make it happen. Or utilize commercial ranges.
frequency allocation - especially in c/uas	Similar to above, modify policy to allow faster approvals. Validate 60 day approval window for GNS/GPS jamming. Create pre-approved templates to fall in on (redundancy).
need available assets - ready to go - maintainers on station, maintenance, O and level maintenance, coast guard license captains, need maritime assets	Pre-approved vendor list. Properly manned and equipped via SOCOM for consistent on-site support for steady state operations.
fixed/mobile telemetry assets for testing	Contract vehicle for quick acquisition of new/emerging technologies and requirements.
proximity of facilities to testing areas	MILCON for new facilities / explore mobile facility options / transportation support / mechanism to integrate external support.
Limited scope of environmental conditions/terrain for testing	Partnerships with other ranges in other environments (desert, mountainous, arctic)
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SDZ limits the overall use of the land - areas need development for usability	Stennis stakeholders collaborating on overcoming this issue prior to standing up the range. Hold a town hall for all stakeholders.
organic support services potentially overtaxed	Pre-approved vendor list. Properly manned and equipped via SOCOM for consistent on-site support for steady state operations.
Development of targetry - MOUT facilities, need expendable targetry. Multi-domain targets (maritime, TOW targets, air-to-air targets) Urban environments for robotics/autonomous. Port Hueneme... can provide support for maritime targeting, also Fleetworx.	Implement a contract vehicle with flexibility built in to acquire based on the user's requirements. Consider engaging the Threat Systems Management Office (TSMO).
Force on force requirements - multiple platforms in competition with other	Establish standing opposition forces who are non-biased. Incorporate industry partners bringing the latest technologies.
Ranges are potentially disjointed - not enabling coordination/communication between autonomous systems	Centralized JOC location with networking that allows for disjointed operations.
Power infrastructure	MILCON project to build out prior to standing up the range.
High performance computing infrastructure	Already exists at Stennis. Possibility to tie in here? If not, build a separate hardware/software laboratory.
Limited ability to iterate	Facilities and personnel available for quick fixes, repair, design, etc. Are consumables available?

Staturatory and regulatory related to operating at Stennis	Modify policy to replicate commercial design/testing concepts. Appetite seems to be there for this...make it happen. Or utilize commercial ranges.
Air/ground/sea transportation corridor limitations between confederated test ranges sites	Initiate policy changes to mitigate limitations.
Limited range control/exercise staff for exercise support	SOCOM requests to update manning document to properly staff the range. Explore contracting options as well.
Range and scheduling capacity limits (needs to be weeks not months, weather windows)	Establish procedures for scheduling range use. Implement latest scheduling software, including vendor access to the software.
Range usage cost	Explore various rates for various needs. Units/sponsors incur some of these costs. Vendors partner with ongoing exercises.
Stennis badging	Replicate best practices for badging from other facilities.
Kinetic testing limitations on the water and at Stennis	Implement new policies to address this limitation.
RF Jamming, GPS denial limitations inlcuding in the Gulf	Implement new policies and might have to look at alternative ranges.
UAS beyond line of sight operations policies, one pilot operating multiple sytems	Implement new policies to allow beyond LoS ops and swarm ops.
Safety infrastructure (kill switches, geofencing, physical barriers)	kill switches, geofencing, physical barriers
Environmental challenges related to crashes, tethering	Environmental mitigation plan to include having required personnel to handle crashes/tethering.
Human/machine proximity safety	SOPs written for safety concerns.
Moving target allowances and parameters	Write (or find) appropriate range SOPs.
Independent evaluation and metrics collection	Bring in FFRDC / UARCs / academia to provide support.
Coalition partner evironment	Keeping in mind OPSEC, create an open environment for collaboration with organizations that are doing this today.
PINK	
How to ensure differenet systems with their own integrated auto. capabilities can work in a single environment... how will they communicate / share data when required?	Neutral 3rd party systems integrator
How to ensure performance in ALL environments -- i.e We're testing in Panhandle, but how to replicate Arctic conditions	MSU Assure
Is there a capacity for digital twinning or will each vendor have to bring their own...	Baseline confederated range sites to create digital twins.
NASA Rocket Engines testing impacts on SOCOM operations	Non issue
Hurricane impacts on the AWPG site	Known issue. Schedule appropriately. X-band weather radar.
Does the infrastructure support scaling up production for immensely successful capabilites	Use scalable non-fixed infrastructure to scale up and down.
Interoperability with other test sites	
Is EOD / Crash Fire on-site & willing/able to support socom kinetic operations	

Are there FAA (or other agency) restrictions on Auto. Target Recognition (ATR) navigation for airborne assets?	
What restrictions currently exist regarding tethered/fiber, airborne operations	
Can Stennis Space Center accept Gray-tail cargo aircraft	
Airspace awareness - may need standardized method for tracking small UxS	
Summer climate at Stennis -- consider affects on hardware components	
Is SOCOM subject to range control costs at Stennis?	
Connectivity - Cell Service, WIFI, NIPR, SIPR, JWCS	
Alot of Camp Shelby AOR is public ground access despite restricted airspace -- may need to consider OPSEC and civilian safety	
Who will have priority of testing... who determines that priority? -- First come/first serve or solely executing orchestrated testing events??	
Exercise Control	
PURPLE	
Approval timelineesss for range access	PMO to coordinate vetting process for policies, databases, vendors, access, frequency request, range, platform usage.
Published common architrectrue - C2. Distinguish between range architecture - needs to fit into real world	Establish a COP- vendor agnostic C2 platform that can openly fuse sensors and platforms
Support for testing - all types of resources - boats - lodging, logistic constraints	dedicated teams for - maintenance, engineering, networking, supply, contracting, HAZMAT
Ability and acclimatizing to low cost/frequent kinetic uXs operations	increased safety measures through high voltage arming devices
IT Network - fiber, wifi, ETC.	Fiber ring set up throughout Stennis with secondary and tertiary connection means (ethernet, MLOS, air fiber, etc)
Access to operationally relevant littoral and open ocean conditions	Buoys, netting, restricted maritime areas, needs to have a perimeter set up to close off the public use waterways
Access to adveserial relevant / replicated devices - EMI, EW, waveforms, etc. - - Including policy and approvals to use these equipments / TTPs	Exploitation Lab data - TSCIF / SCIF access - TEILS
Storage / charging for batteries, power cells -- need to enable testing, charging, storing, etc.	Conditioned storage facility , solar enabled trailers, HAZMAT,
Enabling approvals/policy for getting batteries onto base	Standing exception to policy for specific batteries
Airspace limitations for autonomous aircraft	FAA coordination, real time airspace awareness, full time range personnel
Waterway access from Stenjnisl all the way to Gulf	Have a closer private access point, utilize engineers to build a new waterway drop in, have infrastructre closer to the water, have more drop in locations

Information sharing - repository from what each group s doing to be shared -- lessons learned repository?	Needs to be continuous reporting and sharing across the industry, secure website access to download data? Approved list of OEM's, vendors etc that would have access?
Base access / badging	PMO to vet and have an approved list of accessible personnel, list gets updated every 30 days. expectation to complete a standing VAR
Scale - can we employ at a realistic / relevant scale (to include the being able to cover the distances required)	crawl, walk, run with requirements that detail scale, relevancy
Gov't representation for configuration management	Liaisons
Ability to retrofit/repair on site including required fabrication equipment and personnel	Portable labs, with the ability to go soup to nuts on all hardware/software requirements, upgrades, and maintenance
Operational Security throughout the entire AWPG	Establishing a physical and virtual perimeter both on sea and land. Have seismic, acoustic sensor to track unknown traffic + supported by LiDAR, EO/IR cameras. PHYSICAL SECURITY
On-site / organic spectrum management support	Spectrum Liaison at SOCOM & NASA
Establish a test and evaluation (T&E) framework for vendors/nations to go through	CONOPs template
On-site hardware and software lab for testing/simulation of all-domains of UxS	Establish baseline services for onsite hardware/computing suite, refer to C19
Need solutions for data collection and data dissemination across various environments - how do we transfer it... how do we access it?	Build required networks with enclaves within tempest regulations, single point of network accesses
Integration/synchronization/interoperability of all systems in all domains -- may need a common comms architecture to share between UxVs	Leverage DoW level architecture, Lattice, etc. Establish lists of must haves on site for interoperability.
How do we make all this happen "at the speed of relevance" while protecting the vendors' intellectual property?	IP control must be balanced against gov desires for open architecture and businesses with bespoke capes must work together to meet gov's published clear set of expectations. SECRET and TS sponsorship plan with authorities for promising vendors invited to participate. Current long pole in the tent for small startups.
Energy Storage Architecture - consistent/standard battery pack design	Must have HAZMAT storages areas.
Simulation support for testing - access to the test&evaluation network (TEN) for testing	Standardize modeling and simulation requirements, virtual twinning requirement.
How do we pass data at varying classifications (CUI...)	Managing network access, having the correct network architecture, reduce 2 year timeline for ATO
pilot certifications	Part 107 or military equivalent(ish)
Range Complex for multi domain operations	
Experimentation in RF spectrum (non-standard)	
Live coordination for Threat reproduction	
RF data loss due to jamming	

continuous effects from one training environment to another	
FAA coordination and process	
Basic Infrastructure for classified coordination	
need capability at the edge (expeditionary assests, NIPR SIPR JWICS)	
Threat based requirements to inform testing	
Personnel for manning and to run the ranges	
Allied and partner restrictions for technology exchanges (i.e. Ukraine)	State Department participation for foreign liaison exchanges
Foreign partner involvement for testing and training	ITAR?
Funding for Range operations / access	
process for industry access	
RED	
Kenetic effects size limitation	Change requirements/ expand or change region, create reflective kinetics to simulate explosions
approval timelines for UAS/spectrum	blanket(bucket) blocks of spectra, common frequencies Futher reduction of hoops
spectrum authorizations multi domain	automated web based systems, as opposed to individual appointments
NIPR/SIPR connectivity	^
Dirty internet/closed internet	Vertically integrated cross domain solution Isolated versions for test and eval install it commercial
Testing/event support staff	^
lab establishment/management	group of people hired to manage systems
fully autonomous testing/evaluation	^
surface/subsurface down vessel safety/environment considerations	Develop autonomous testing, will require procedure for autonomy, and comms denied situations/sims
classified space / comms	recovery planning/infrastructure/requirements/commercial/government (scuba, subs, leave it there) Build isolated infrastructure to contain
network capabilities - wifi, fiber	^
access to T&E networks, & data, etc	^
Range and test instrumentation & infrastructure	Additional buckets for information/T&E access monitoring Training data is more and more important, gov access, access points IT infrastructure build blocks for what can/cant be shared define shared spaces
Independent evaluation / evaluators	develop, (no runway, but there are runways nearby 45 -> 1 hr drive) on and off corridor
Base access	Academia, commercial, military, define input devices/groups support university funding/ relationships Potential SOCOM funding line for academia more input is helpful
Relevant scale	Open the gates multiple funding sources, sponsors, ensuring codified standards for visitors international partner standards
	Range size - Expand limnits to range if applicable range is not available. Create simulated test-beds for scaled test/envirnments if needed.

Opfor, participants, simulated - LVC	Working battlespace should be available so you don't have to bring the full build out the organic capability at stennis query soft components for existing opfor capabilities
Access to adversarial tech, systems	^ continually upgrade as technology advances, replicate battlespaces
Location considerations - travel logistics, hotels/lodging	Build it, or it will build itself, sponsor it, convert buildings into barracks
Access to participants with requisite characteristics, skills	Advertise and resource capabilities at Stennis, Hire & train, certifications
Stakeholder and funding alignment	SOCOM plan to purchase things that make it through testing at stennis, stays there as a resident infrastructure (at minimum - potential for scale - furthering of feedback, test, eval) ultimate acquisition strategy for purchase/development
DOTMLPF considerations	system requirements, feedback, enterprise needs to be a party mechanism for SOCOM participants to write updates across all DOTMLPF, you are responsible and help accountable to give feedback at speed
Cyber - CMMC, ATO/IATT - authorizations (local, accessible AO)	fund a federated test network & continuous intergration environment, including software, test, cyber, etc - federated intermediate test bed network representative of a real network to similar to NTS TIP lab
Funding - colors of and aligned to T&E; outcomes - contracts	Acquisition plan needs to align to Stennis activities; including procurement dollars for purchasing the platform, outside input/engineering
Infra modernization	<- Get it done
Standardized evaluation framework with common human system admission metrics	Updated into general knowledge base
RF / GNSS jamming - EMOE, able to whitelist (range instrumentation)	Procedures/range developed for jamming, spoofing
Safety release process too slow and restrictive	Having the people requiried RSO's, medics, etc, pre-funded or reserved lowers barrier to entry - systems in place to lower barrier of entry
TEAL	
policy issues/constraints	Setup mechanism for waivers, ability to operate under indirect fires policies
OPFOR force availability	Need funding and contract vehicles to make this available; Also need expertise for the OPFOR - perhaps leverage Ukraine (e.g., JATEC in Poland) RTI Camp Shelby access to soldiers
Jamming constraints	Do jamming operations at other locations and not at Stennis. Perhaps at sea? Use Camp Shelby; Emulate jamming effects; Come up with the largest Faraday cage in the world
bifurcated ranges- unctiguous	Perhaps establish VFR air corridors between ranges
multidomain restrictions: Multi-terrain combining these domains/terrains (air/land/sea)	If colocated testing is not possible, good data collection may help; Can the mission state (e.g., fuel, damage, losses) be captured and transferred from one location to another (e.g., to show continuity of the operation)

unknown scope of solutions for specified and unspecified problem sets (how far can I fly/shoot/etc.? how far do I need to?)	Ask industry for what they want to test. Use lessons learned from Ukraine-Russia war to determine requirements for the capabilities to test. Make sure there are touchpoints between industry and warfighters to help clarify requirements. Develop a (continuously updated) list of requirements / scenarios that are the objectives
How do we integrate all the data sets into a common operational set that's usable.	Need a team to collect and curate the data sets for training models (after the fact); ON the other hand, when it is real-time, need to determine where does the data need to go? All the way to a Command Center? Ensure that the range has a communications network for monitoring / data collection
Need to understand ultimate requirement/objective outcome for testing? And identify what constraints based on these objectives	Same as the answer for #8
limited capacity to test/evaluate capabilities: communication across entities/academia/industry/gov, etc.	Organize more events like this to bring together players from all sides; Perhaps gather information from universities about their capabilities, current research areas, and interests
Who has access to the expanded range?	Clarify when the facility is setup
How to create a "business model" that supports the maintenance of and resources for the "range"	Perhaps add additional funds to contracts that are specifically for testing costs? Look at other places (e.g. Crane, Aberdeen) where they have setup incubators to support this type of ecosystem. Also look at NATO DIANA - which incentivizes companies to go test at specific centers.
limitation: the need for a test team or staff (third party) for systematic standardized testing- what is the framework? (unbiased)	Perhaps look to UARCs for independent, unbiased testing?
Integrating testing/exp. from the virtual space? (lesser matured tech) through phases to maturity	Consider using Digital Twins to do initial testing / integration testing / risk reduction in simulated environments; Encourage using Open APIs and open standards to enable easier integration
software / hardware integration: may require special labs / instrumentation / sensors	Similar to 16 - use Open APIs and well-defined standards where possible. Leverage capabilities of existing Govt. labs and their specialized capabilities
Range limitations (facilities, ranges, spectrum env.)- how to identify the left/right limits to build beyond those	Look at MS State and GVSC for ground vehicle testing conditions.
civilian / civil environment: mitigating disruptions (both ways) Ex. Can you seal off a portion of the Gulf for testing?	Setup automated web-based forms (e.g., the FAA form that is used by drone pilots) that can automate access / deconfliction
safety:	
long-range NOTAM management for airspace access	Good idea - proceed
physical range setup: What requirements are needed to test in/ against?	Examine what is being done at other facilities - leverage from lessons learned; Also look at answer to #9
ability to build synthetic / simulated range capability: Ability to build and merge physical and synthetic range environment	Digital Twins are a good way to test in emulated environments for risk reduction. Reduces range time utilization / wastage
a common architecture to tie entities together: Ex. how do you keep your tech from interfering with my tech?	Look at existing tools for spectrum management / ground truth sensor to make sure one test is not interfering with another

how to ensure this architecture replicates the true operational environment?	Use this range as a stepping stone to more operationally relevant exercises
disconnected facilities/range environment	Previously addressed
data backhauls: how to maintain / manage useful dataset across multiple ranges/facilities/labs?	Previously addressed
lack of support infrastructure: limited test vessels / indoor ranges/ etc.	Try to improve by investing in additional infrastructure
lack of operationally relevant conditions to test against: littoral / open ocean environments, and others	Consider using a Live - Virtual - Constructive environment to bring in elements that are not locally available at Stennis
Everyone believes their LLM provides the best solution (proprietary solutions for problems that require nonpropriety) AI strategy? LLM adjudication	This is the reason for setting up a range - evaluate them in a controlled, relevant environment
Having a beyond the horizon objective for a program of record or stable resource picture to ensure continued funding for long-term testing/development	SOCOM already seems to have a plan for this
The "safety box" problem: Limitations (environmental, civilian, public safety, policy) that limits physical, electromagnetic, cyber, etc capability testing	Again, use Digital Twins / LVC environments to bring in things that cannot / do not exist locally
Battery logistics: size, storage, management, approvals, etc.	Build necessary facilities (or repurpose the bunkers)
Kinetic munitions logistics: HAZMAT regs, storage, movement, etc.	Build necessary facilities (or repurpose the bunkers)
personnel lodging limitations: ability to easily house personnel on/near testing facilities	
Limited airports?	
WHITE	
30 Day AWR approval is not conducive for rapid UAS dev	submit for AWR waiver request. Allows to execute prototype and R&D. However the process, it needs to be crystal clear to industry - administrative work a burden on developing orgs. Dedicated personnel/team to assist and speed this process up - one POC/office for industry to submit to, and the team coordinates with all relevant authorities. Needs processes to include ground - not just air and maritime.
Hard no spectrum is close to 2.4 GHz	Establish clear guidelines for non-standard comms, and what certifications are required.
JF-12 # - ~1-2 year process and needs to have gov sponsor	Mil-spec and FCC not aligned. Industry goes through a different process than gov org, and its confusing.
GPS/GNSS/all constellations (jamming, etc.) needs not addressed	Submit waiver authorization for GPS/GNSS jamming ops. Identify additional locations where this is feasible, created an ecosystem of training areas if needed (Camp Shelby).

Red cell? Test against/evaluate?	Establish threat replications support/assets, C/UxS assets for UAS for example, adversarial fleet of UxS for C/UxS, fixed on site assets preferred, but could be accomplished with proper scheduling and coordination of industry (well-planned events).
Approval process of HAZMAT (munition/etc) on UAS (really an FAA req)	te
operational end state?	flexibility required, scalable, customer driven. Don't try and be a once-size-fits-all, incorporate and collabora
BVLOS/DAA solutions? Can be mitigated by being in a SUA/restricted airspace	Accomplished through proper planning and coordination, deconfliction manager, use of other sites in the ecosystem.
Handoff of systems / training of SOCOM operators	establish a centralized training center, counter systems, fielding and maintenance, threat recovery/exploitation (SSE tools). TTPs
access to multi-domain targets - land/maritime/air tow, etc...	Establish threat replications support/assets, C/UxS assets for UAS for example, adversarial fleet of UxS for C/UxS, fixed on site assets preferred, but could be accomplished with proper scheduling and coordination of industry (well-planned events).
physical security/perimeter concerns - cyber as well. CI concerns with location.	Security vulnerability assessment. Develop and harden as a response to assessment.
smaller, self-contained, "exclusive testing" essentially an area to conduct highly-sensitive testing	Ensure there is consideration for privacy for industry during development, NDA development, employ best practices from other training venues.
Maritime: O&I maintenance, chase boats, notice to mariners, licenced captains, instrument engineers, asset and support heavy - needs to be considered and provided	Identify multi-domain planner - an office - proper heirarchy of planners, ownership in categories air, ground, maritime. As for the maritime support requirements listed, solicit industry/contractors to provide. Blue-White-Red cell coordination. Exercise control group.
Maritime: instrumentation, water-column, fixed assets for the operating areas	Requirements need to be identified early in the development process.
SCIF/TSCIF	
spectrum requirments, approval times, not supporting "rapid" development.	
Manufacturing on site? FAB bays? 3D printers, tooling - theres also privacy requirements associated here for individual companies/orgs - possibly seperations between industry and gov	
battery storage, battery charging considerations, common architecture for packs, disposal	
integration of data/reporting with academia- hub?	
laser clearing house, approvals, directed energy capabilities, need their support	
There needs to be some sort of "reference architecture," guidelines, rules of playground, integration guidelines for industry,	
YELLOW	

Restrictions of approval timelines	-- People problem: Assign approval authorities and consolidate approval timelines/approvals -- Define stakeholders, authority levels and associated impacts, MoUs across fed, state and local. Need to understand timelines for training outside of the Stennis Training area + other TAs -- Collaborative platform for coordination (specific to AWPg) -- pre-approved standardized exercise templates that reduce planning effort and coordination across multiple parties
realistic exploitation	dependent on desired training outcomes, tailor exercise/ scenario to specific requirements
increase the explosive yield/weight	Modify policy
GPS / GNSS testing	Technical: Requirement for synthetic / simulated jamming capabilities; Policy: need an authority to execute jamming on GPS/GNSS (impact on local stakeholders); working with the folks to understand how we can work together without major disruptions
Federal process constraints	Policy problem: process that can be followed by acquisitions, operations, industry, academia. Establish base liason / portal / "One Stop Shop" to streamline requests. "How do I get to a yes?"; Create an administrative access plan to assist with getting folks on base (industry, academia etc)
Spectrum clearances	Need a process to follow, with appropriate requirements and authorities. Similar to the challenges above. Automate request and approval process where feasible
Jamming and Power?	Define what capabilities are available, define who can approve / disapprove exceptions, clearly define current capabilities and stakeholders. Who does this at Stennis today? Power and Jamming requirements will be dependent on the desired training outcomes, which will dictate infrastructure and operational needs
Define multidomain, swarm, generic terminology	
Range capabilities	Create a consolidated information package for all ranges: size, equipment, aircraft ceiling, power, storage, HAZMAT etc etc. Ties into portal / One stop shop. Build a common environment that connects physical, virtual, synthetic range instrumentation that supports mission planning / training
undefined requirements	clearly communicate requirements
SCIF/ TSCIF	Build it or provide capability to implement TSCIFs
End user access	Create one stop shop at Stennis to work as liason for users. What do users need now, and what will we need in the future? Section off full area specific to AWPg use
Testing and evaluation - limited range use for multi domain capability	Need to understand geographic overlap of various domains (Space, EW, Cyber). Define standard range capabilities (What do I have, where is it, and what can I use?)

Intel feeds that shape the framework of testing - knowledge management SDZ/WDZ - maritime / underwater	Consolidate data framework, ability to pull / push data feeds where needed, need to have virtual / constructive / synthetic data sources or sensors that support the training; Ability to manage autonomous vics + agents, finetune and / or train models, requirement for a High Performance Computing Lab, mobile data centers.
Transportation to "water" ranges / access to port, waterways	Policy problem, define authorities and restrictions.
Environmental constraints	Goes back to range capabilities and non-contiguous operating environment. Will require infrastructure to support (hard-stand or mobile)
Ability for a Common Operating Picture	Define current effects of existing protected areas on the training area, determine impact to operations, adjust or refine as needed
Sensor Integration	Create and implement an Operations Center, staff and provide infrastructure to manage and collect data from all ranges and sources. Tie to test environment. Include capabilities to manage virtual, constructive
physical security - perimeters - Need a provider	Establish sensor architecture, enforce open standards and open source dev, sensors tied to API framework, define sensor requirements and types by location and domain
defined experimentation life cycle	Build perimeter, establish security. Will also require HAZMAT, arms room, monitoring system for all infrastructure, security CoC
expeditionary labs / MTTs	Process that defines test goals, collects test data, manages test process and timeline, presents data to make decisions. Delineate requirements, testing framework, testing outputs, presentation of testing data and analysis, decision criteria
Large airspace clearances	Allocate space and resources for mobile capabilities. Define requirements and tie to funding. AWPGE should function as a integration facility for all autonomous systems (physical and virtual) --> define the required infrastructure
maritime explosive ranges? underwater constraints? Buoys? Netting?	Policy problem --> goes back to one stop shop (FAA coordination)
lack of a neutral 3rd party engineering integrator -	Yes
lack of a neutral 3rd party engineering integrator - T&E planner and execution team	establish a prime integrator to manage AWPGE. Serves as the collaboration partner for industry / academia / etc
realistic targetry	see row 28. Execution including Human - Machine teaming interface, with qualitative data collection at the edge
where does data flow stop? what is objective outcome (high/low)?	Yes
secondary site (not collocated) to test data transport/commonality requirements	Establish data architecture that support both real time data collection and allows for retrospective data analytics. Need to have a data platform that supports all types of data (structured, unstructured) and uses open standards to integrate with all sensors, payloads, qualitative reports etc
	Capability to network with complimentary ranges (ie. ranges with Sub-T, cold / arid / arctic / mountain environments). Will require common data architecture, data tagging, data available for access across various areas

EW resiliency testing?	Yes
telemetry standards for data transport	Yes
need standards for open architecture vs. proprietary	Direct and enforce open standards/ principles to enable industry participation and streamline multi-party integration
fast/iterative design changes based on lessons learned difficult due to policy constraints	Collect and define constraints, identify process or authority to remediate policy challenges
clear objective outcomes - what does "autonomous" really mean? where does this concept stop? edge? TOC?	Gov stakeholders need to completely define concept of autonomy and tie to operational or technological outcomes to drive innovation
inadequate range management/request infrastructure. recommend simple form website allowing vendors to input range use requests (rather than manual email to POC's)	One stop shop / portal --> consolidate what you need to where you need it
need standardized process to make it easy for vendors to work together rather than compete/withhold	Yes
international partners/international requirements	Define requirements, implement policy to support international partners
need fewer policies for kinetics (same as indirect fires) rather than FAA, other restrictions that prevent innovation & adoption	Yes
how does USG incentivize companies to work together under a contractual framework? companies need to be incentivized to come to the range and work with potential competitors	Streamline follow on acquisition activities: what is the pipeline if a company is successful? Define next steps with companies. Provide data packages with required user feedback