MITCHELL INSTITUTE
for Aerospace Studies

Logistics While Under Attack: Key to a CCA Force Design

Why this project?

Two major objectives:

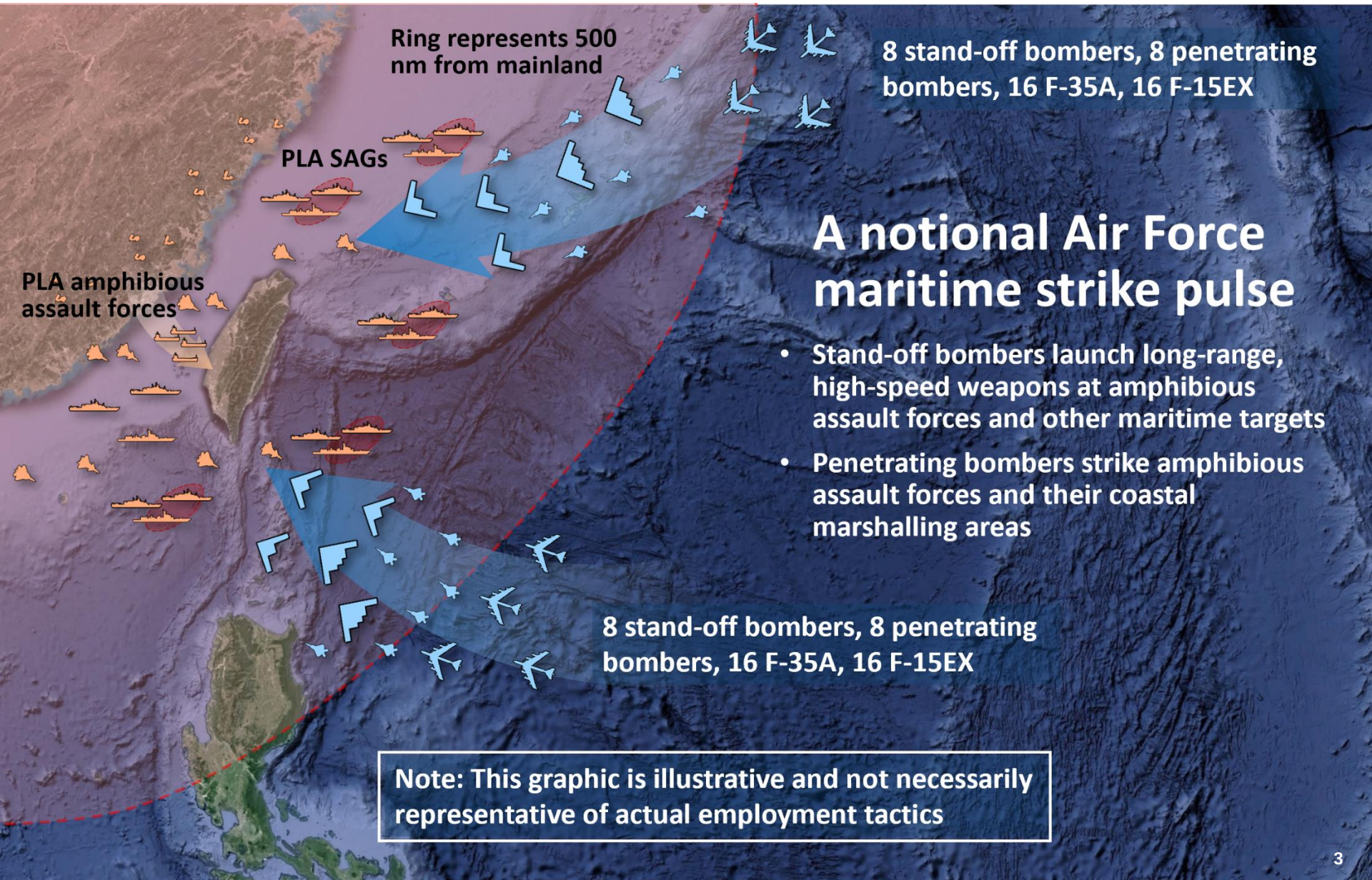
- Assess how **logistics** required to support CCA operations during a Pacific conflict could impact the Air Force's CCA force design
- Better understand how CCA could help **broaden** counterair operations during maritime strikes and **maintain pressure between strike surges** in a defense of Taiwan scenario

Develop specific insights on:

1. How logistics should shape the future CCA force mix
2. How changes to CCA operating concepts, force mixes, and theater posture could reduce logistics risk
3. Forward postures to sustain distributed CCA operations at scale
4. How CCA could help increase Air Force's counterair effectiveness

Mitchell Institute's report is based on insights and recommendations from Air Force & industry logistics and operational experts, planners, and technologists

Teams of experts planned air superiority missions in support of AF maritime strike surges



Three teams selected mixes of CCA and piloted aircraft for their missions

Mission: Sweeps

Develop a plan to suppress Red fighters and their airborne BMC2 in support of Blue maritime strike pulses

Mission: Protect HVAA

Develop a plan to suppress Red long-range counterair kill chains (including KJ-500) and other threats to allied HVAA aircraft supporting maritime strikes

Mission: SEAD

Develop a plan to suppress surface-to-air threats on SAGs operating north and east of the Taiwan Strait to screen Red Navy amphib assaults; priority targets include Dragon Eye radars and other long-range sensors

Three-step methodology for this exercise

1. First develop initial plans unconstrained by logistics
2. Then assess CCA logistics requirements & risks
3. Revise mission plans to reduce logistics risk

Teams chose CCA for their missions from a provided list of notional representative designs

Mitchell Institute characterized CCA as **"recoverable"** (designed for multiple missions) or **"expendable"** (designed for a single mission)

CCA 1: Counterair
Recoverable

- Cost band: > $40 million
- Gross weight: 72,769 lbs
- Survivability: VLO
- Sensors: AESA, IRST
- Weapons: 2 x SiAW; 4 x AMRAAM
- T/O: Runway 10,000 ft or more
- Landing: Runway 5,000 ft

CCA 2: Counterair
Recoverable

- Cost band: > $40 million
- Gross weight: 51,231 lbs
- Survivability: VLO
- Sensor: AESA, IRST
- Weapons: 2 x SiAW; 2 x JATM
- T/O: Runway 8,000 ft
- Landing: Runway 5,000 ft

CCA 3: Counterair
Recoverable

- Cost band: $30-40 million
- Gross weight: 16,500 lbs
- Survivability: VLO
- Sensor: AESA, IRST
- Weapons: 6 x AMRAAM
- T/O & landing: Runway 5,000 ft

CCA 4: Counterair
Recoverable

- Cost band: $20-40 million
- Gross weight: 27,000 lbs
- Survivability: VLO
- Sensor: SAR, ATR
- Weapons: 6 x SiAW or 12 SDB
- T/O & landing: Runway 5,000 ft

CCA 5: Counterair
Expendable

- Cost band: $2-6 million
- Gross weight: 3,000 lbs
- Survivability: LO
- Sensor: EO/IR, RF
- Weapons: 2 x AMRAAM (or 4 SDB)
- Ground and air-launched capable
- Landing: No

CCA 6: Counterair
Recoverable

- Cost band: $2-15 million
- Gross weight: 3,300 lbs
  Survivability: LO
- Sensor: EO/IR, RF
- Weapons: 2 x AMRAAM (or 4 SDB)
- Ground and air-launched capable
- Landing: Potential parachute

Included CCA capable of air-to-ground strikes, electronic attack, ISR, communications support

Teams could modify these notional designs to meet their mission needs

CCA 7: Strike
Recoverable

- Cost band: $20-40 million
- Gross weight: 33,688 lbs
- Survivability: No LO
- Sensor: No
- Weapons: 2 x LRASM
- T/O & landing: Runway 8,000 ft

CCA 8: Strike
Expendable
(loitering PGM)

- Cost band: $2-15 million
- Payload: Carry 20 small UAS
- Survivability: Not LO (small form)
- Sensor: Low-cost EO/IR
- Air-launched (B-52), rockets

CCA 9: Strike
Expendable
(loitering PGM)

- Cost band: $2-15 million
- Gross weight: 2,769 lbs
- Survivability: VLO
- Sensor: Low-cost SAR
- Air-launched (B-2, B-21)

CCA 10: ISR
Recoverable

- Cost band: $2-15 million
- Gross weight: 3,400 lbs
- Survivability: LO
- Sensor: SAR
- Weapons: None
- T/O & landing: Road, runway 2,500 ft, rail

CCA 11: Electronic Attack
Expendable

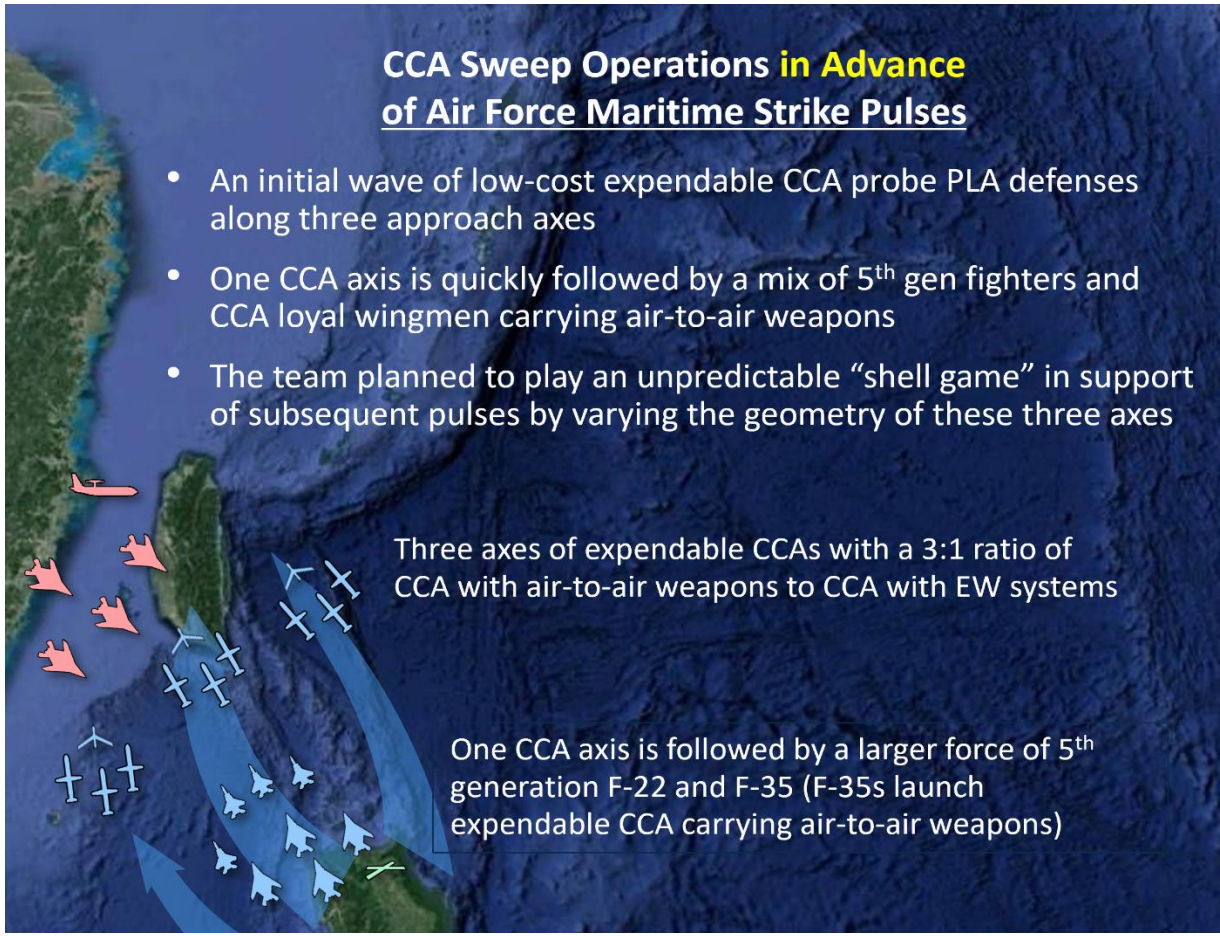
- Cost band: $3-9 million
- Gross weight: 3,000 lbs
- Survivability: VLO
- EW: ELINT, SIGINT, EA
- Ground and air-launch (fighter, bomber, transport) capable

Note: CCA-6, 7, and 10 were roughly aligned with known CCA Increment 1 mission sets and cost targets

Sweep Team's initial operating concept to support Blue Air Force maritime strikes

Team used CCA to create uncertainty, improve air-to-air shot geometry/Pk, and force Red's air defenses to react and expend resources

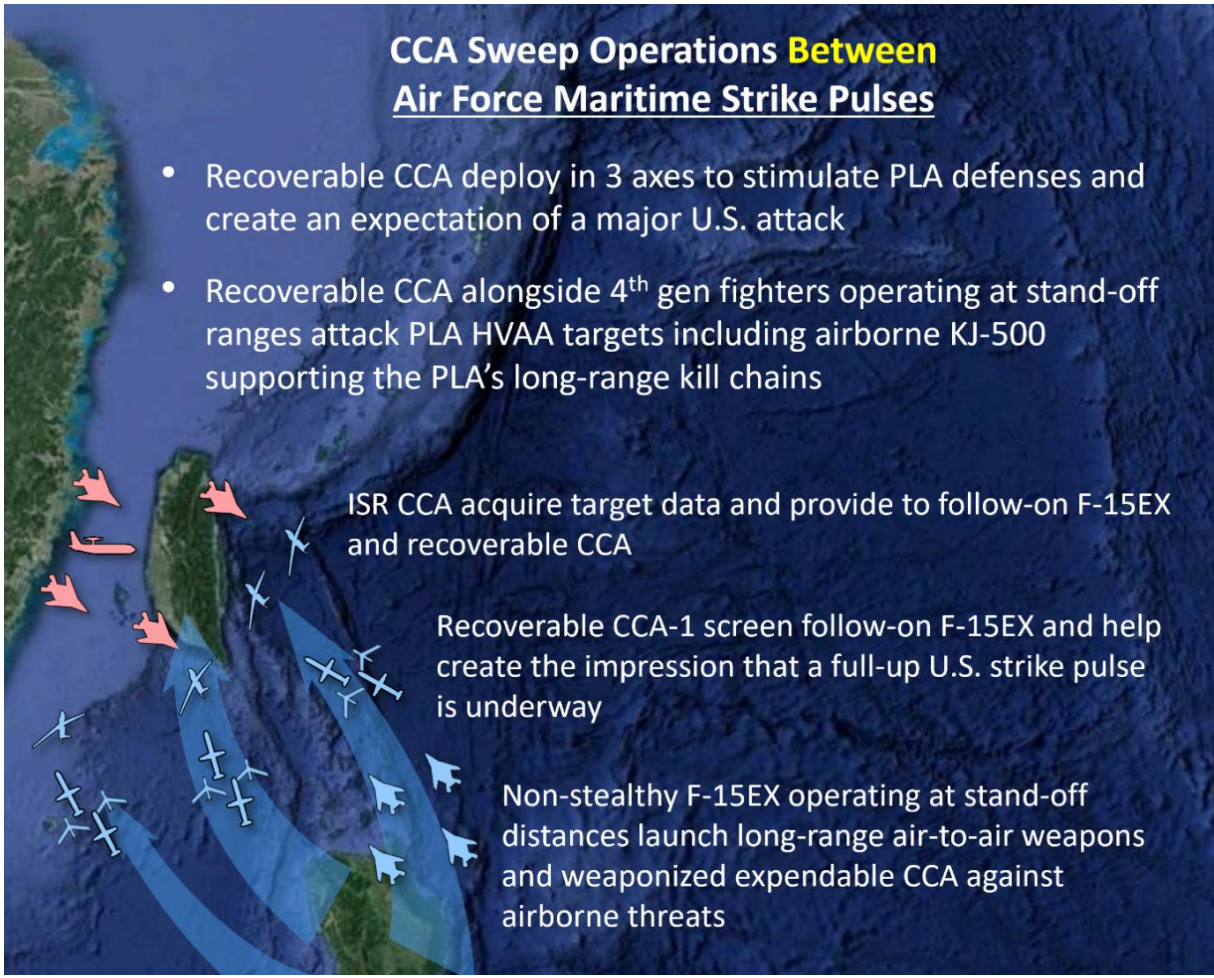
- Combined air-to-air and EW capable CCA in three simultaneous lines of attack: One combined CCA and 5th gen fighters, two lines primarily consisted of CCA
- Team varied location of the fighter-CCA line of attack to avoid a "gorilla up the middle" predictability problem and play a shell game to confuse Red defenses in advance of Blue strikes



Sweep Team's operating concept between Blue Air Force maritime strike surges

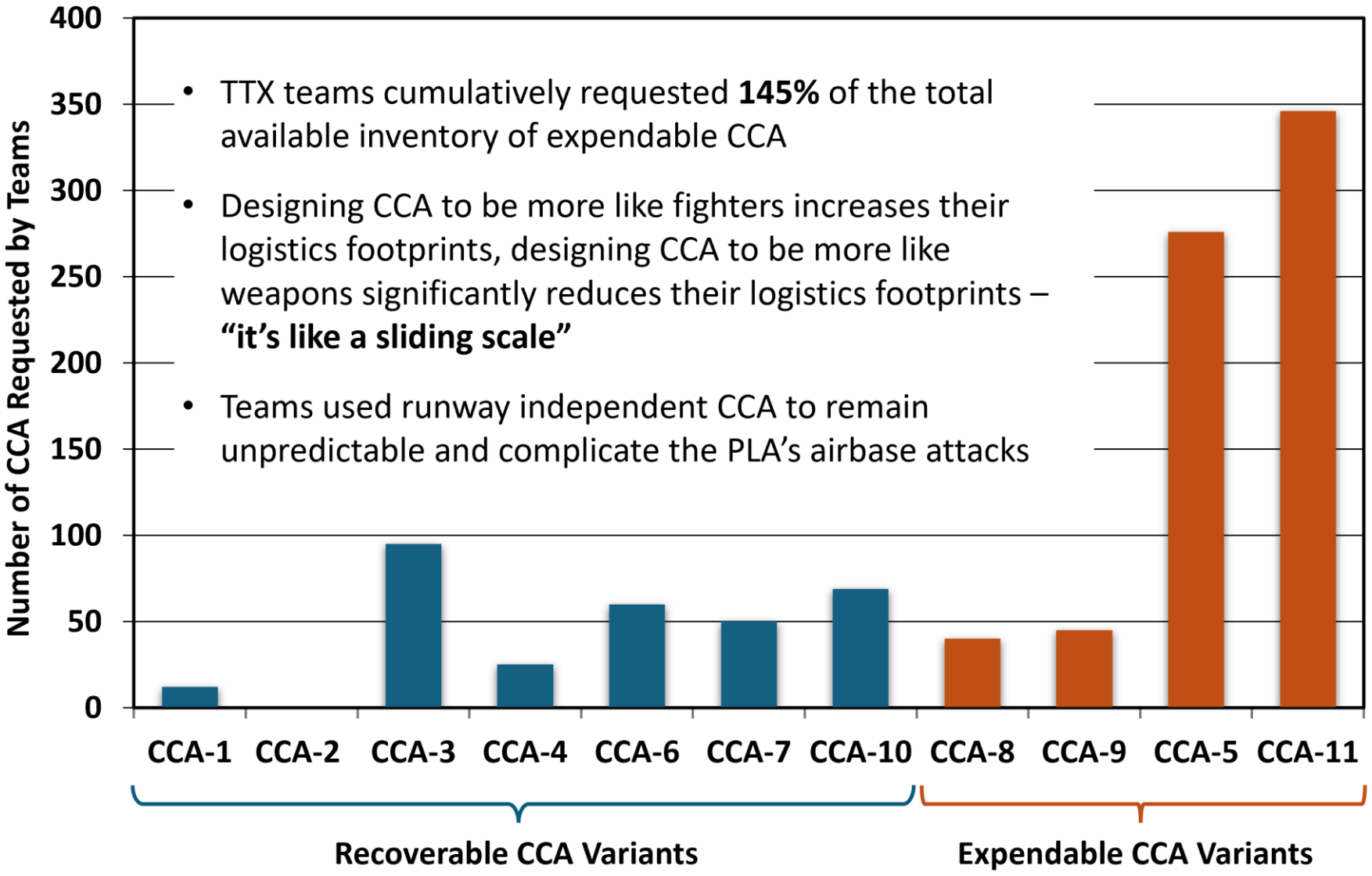
Used recoverable CCA and 4th gen fighters to maintain pressure on Red's forces and deny Red time to regenerate between Blue's maritime strikes

- Used higher-end recoverable CCA-1 to provide early warning and screen for Red J-20s in advance of F-15EXs operating with CCA
- Used F-15EX armed with expendable, weaponized CCA to take long-range shots of opportunity cued by airborne early warning or other ISR, but otherwise conserved their expendable CCA for later use



CCA requested by teams for their initial plans

(requests were constrained by available CCA inventories but not by logistics)



Overview of top-level logistics risks

Teams' top concerns: shortfalls in CCA munitions and expendable CCA

- The total number of air-to-air missiles the three teams planned to launch from CCA could exceed the available inventory in less than 7 days

Potential shortfalls in theater airlift to sustain distributed CCA locations

- Theater airlift will be in high demand; available capacity may not be enough to sustain all recoverable CCA sorties planned by the teams
- Teams also identified the need for sustained C-130 sorties to provide fuel to multiple distributed CCA operating locations

Other CCA fuel concerns

- Total fuel storage and daily fuel pump rates at CCA operating sites
- Required fuel types, fuel quality, and fuel additives for CCA
- CCA refueling methods (pressure refueling vs. over the wing refueling)

Teams' CCA logistics risk reduction actions

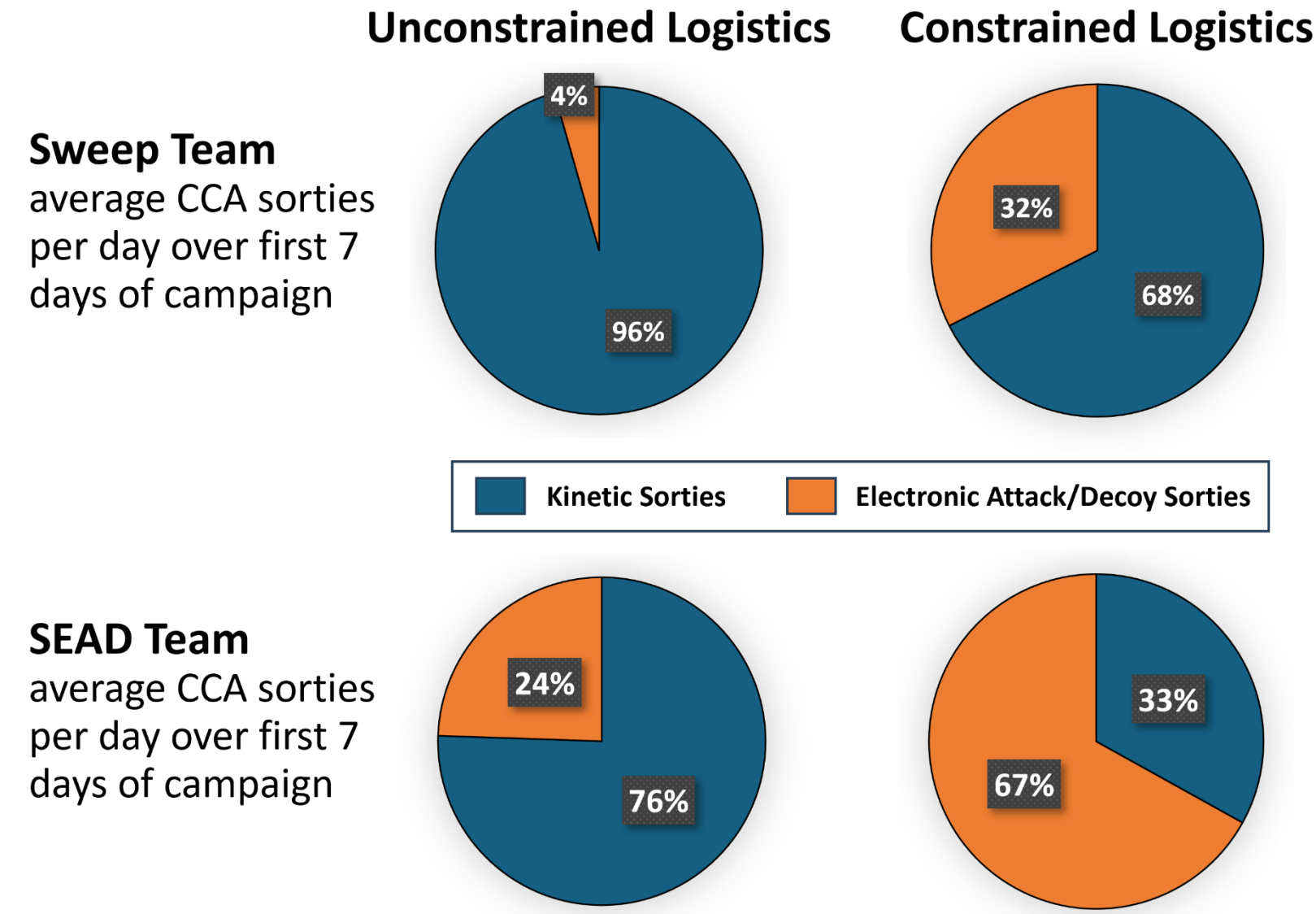
Actions to compensate for shortfalls of expendable CCA:

- Teams shifted toward launching more recoverable CCA sorties
- Prepositioned containerized expendable CCA at distributed operating sites to reduce airlift requirements for initial CCA dispersal and replenishment
- Also relocated some expendable CCA at established fighter bases that had greater logistics resources

Actions to compensate for munitions shortfalls:

- All teams reduced their planned munition launches due to shortfalls
- Two teams changed their force mixes to include more EW capable CCA
  - Used EW capable CCA to mimic piloted aircraft, force Red fighters to waste fuel and weapons, and "desynchronize Red sorties with our maritime strikes"
  - Teams also desired CCA equipped with other electronic attack system, and modular "Lego-like" mission systems/sensor packages

Sweep and SEAD teams shifted toward employing more electronic attack/decoy CCA sorties



CCA logistics risk reduction actions (continued)

Compensating for C-130 sortie shortfalls:

- Teams proposed using uncrewed "collaborative mobility aircraft" or uncrewed turboprop aircraft to replenish CCA munitions, critical spare parts, and reduce the number of C-130s operating inside Red's threat envelope
- Essential to preposition materiel at CCA locations that will be at risk of attack
- Increased reliance on local economies (host nation support) to replenish bulk stores like food, water, and fuel if available

CCA posture changes:

- Teams shifted some of their CCA ground locations further away from Red threats because of risk to C-130s
- Teams not overly concerned about attacks on CCA sites because of their small logistical footprints and lower CCA costs – still need to defend cadre

All teams prioritized basing CCA inside the first island chain believing it was worth the risk … BUT sustaining high CCA OPSTEMPO at these locations will require more airlift capacity and possibly airlift aircraft smaller than C-130s

Logistics recommendations

Logistics must inform the USAF's CCA capabilities, force size, and force mix

- CCA logistics challenges are not insurmountable, but they must be addressed as part of the Air Force's CCA development effort
- Design recoverable CCA to minimize logistics and personnel required to turn their sorties at distributed locations

Balance the number of different CCA variants in the force with their logistics requirements

- Too many unique CCA designs with different sustainment requirements could complicate their supporting logistics operations while under attack

Munitions and a CCA force design

- Seek to maximize the commonality of munitions used by different CCA variants to reduce their logistics sustainment requirements
- Align the CCA force mix with available munitions inventories; possibly optimize future munitions for CCA

Logistics recommendations (continued)

Also prioritize the acquisition of CCA capable of creating non-kinetic effects

- EW variants of CCA capable of non-kinetically disrupting, degrading, and destroying electronic systems that form the core of an adversary's IADS

Take advantage of smaller CCA footprints on the ground to generate more combat sorties from higher risk locations closer to engagement areas

- Teams were willing to base CCA further forward because of their smaller logistics footprints and lower costs compared to piloted aircraft -- "CCA bought us opportunities to generate sorties closer to the fight"
- Distributing CCA operations helps decompress logistics at piloted aircraft bases

All 3 teams suggested using uninhabited aircraft to support distributed CCA sites that are located inside Red's missile threat ring

- Consider cargo-carrying CCA variants/equip CCA with a cargo pod, or uninhabited variants of a small, commercially available aircraft to replenish CCA munitions and reduce risk to C-130 aircrews

Operational recommendations

Use CCA to help maintain pressure on adversaries between strike surges

- Manage tempo of expendable CCA launched from the ground and air to sustain attacks 24/7 on emerging targets during a blunt operation
- Use CCA to enable 4th gen fighter long-range kill chains to maintain continuous pressure on adversary air defenses including SAGs

CCA will complement but not replace 5th gen fighters and the F-47

- Determine how best to combine CCA and piloted aircraft to create unpredictable threats that adversaries determine they must honor

CCA and their counterair operating concepts should not be limited to improving how the Air Force has fought in the past

- Use CCA in asymmetric ways to disrupt, detonate, and exhaust enemy defenses

Acquire CCA at scale as rapidly as possible, including lower-cost, expendable aircraft that can be used to absorb risk and disrupt adversary operations

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