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Understanding the Promise of Skyborg and Low-Cost Attritable UAVs

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Overview

What are the issues?

- Understanding Skyborg, AFRL's Low Cost Attritable Aircraft Technology (LCAAT) programs, and attritable/reusable UAVs (A/R UAVs) they are developing
- USAF's diminished capacity to generate combat airpower against a peer enemy
  - The service's Combat Air Force is too small, too old, lacks sufficient survivability
  - Missile attacks on theater airbases could suppress USAF combat sortie generation

What are the opportunities?

- A new, affordable option to help increase the USAF's combat capacity
- A/R UAVs that can launch and recover without airfields would improve the USAF's ability to generate combat power from inside A2/AD envelopes
- They will also help increase survivability of the force and enable new operating concepts for networked, manned-unmanned teaming
- Affordability + modularity create new options for acquisition and operations

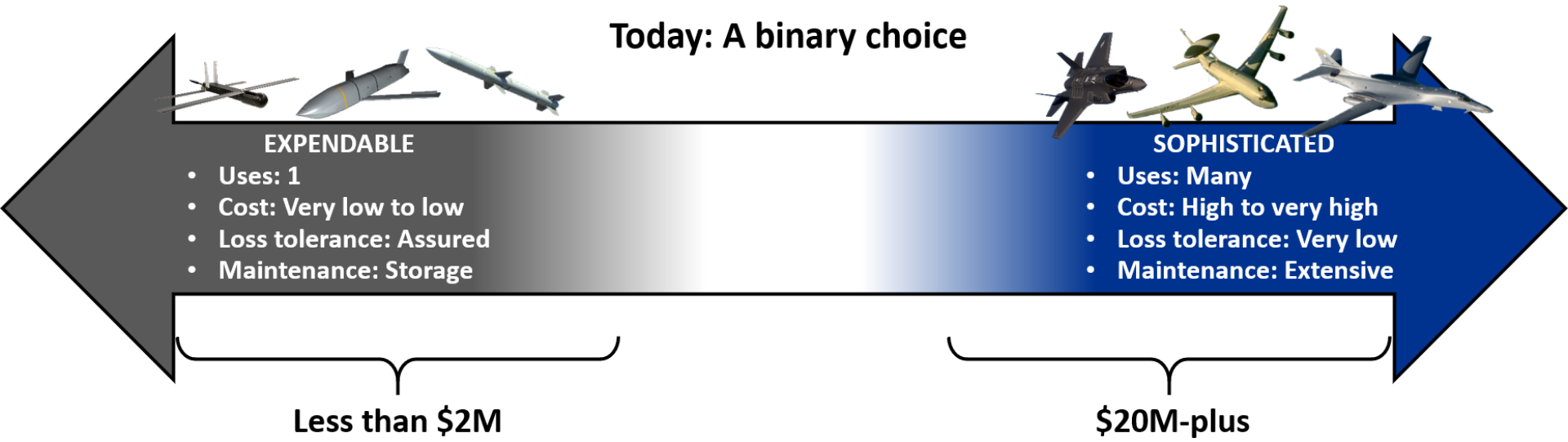
Describing A/R UAVs

- **Attritable:** Low cost, highly reliable and some durability, life cycles measured in a few years or less, designed with some survivability attributes
- **Reusable:** Tens to 100 sorties
- **Low cost:** $2-20 million flyaway cost depending on their mission systems; enabled by novel manufacturing, small advanced turbine engines, etc., to reduce time and cost to manufacture

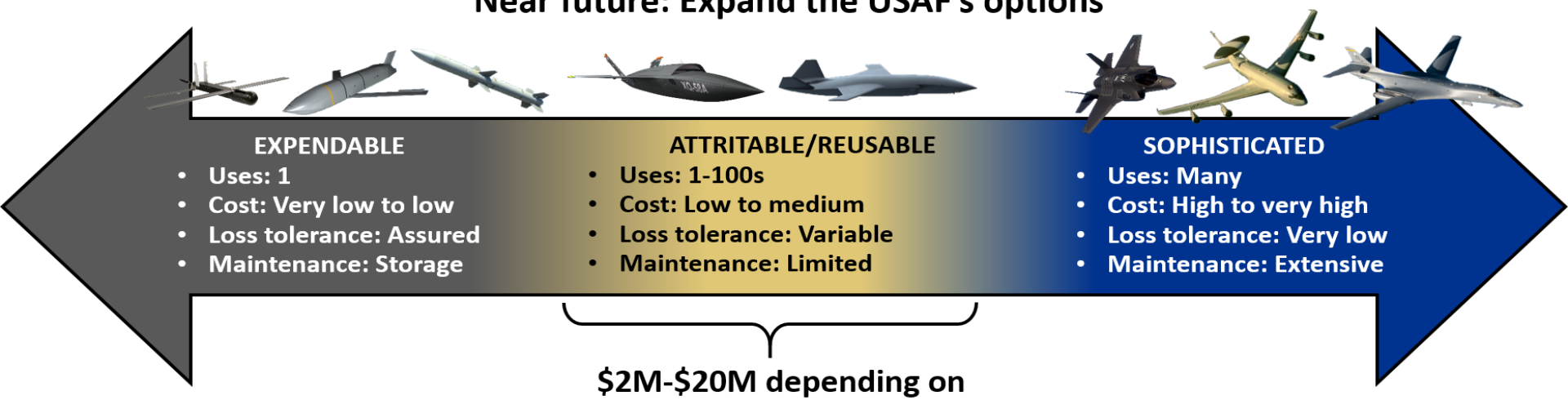
- **AI enabled**
- **Modular**
- **Capable of networked/teaming ops**
- **Some designed to launch and recover with or without airfields**

A/R UAVs are a new option to help grow the USAF's combat capacity

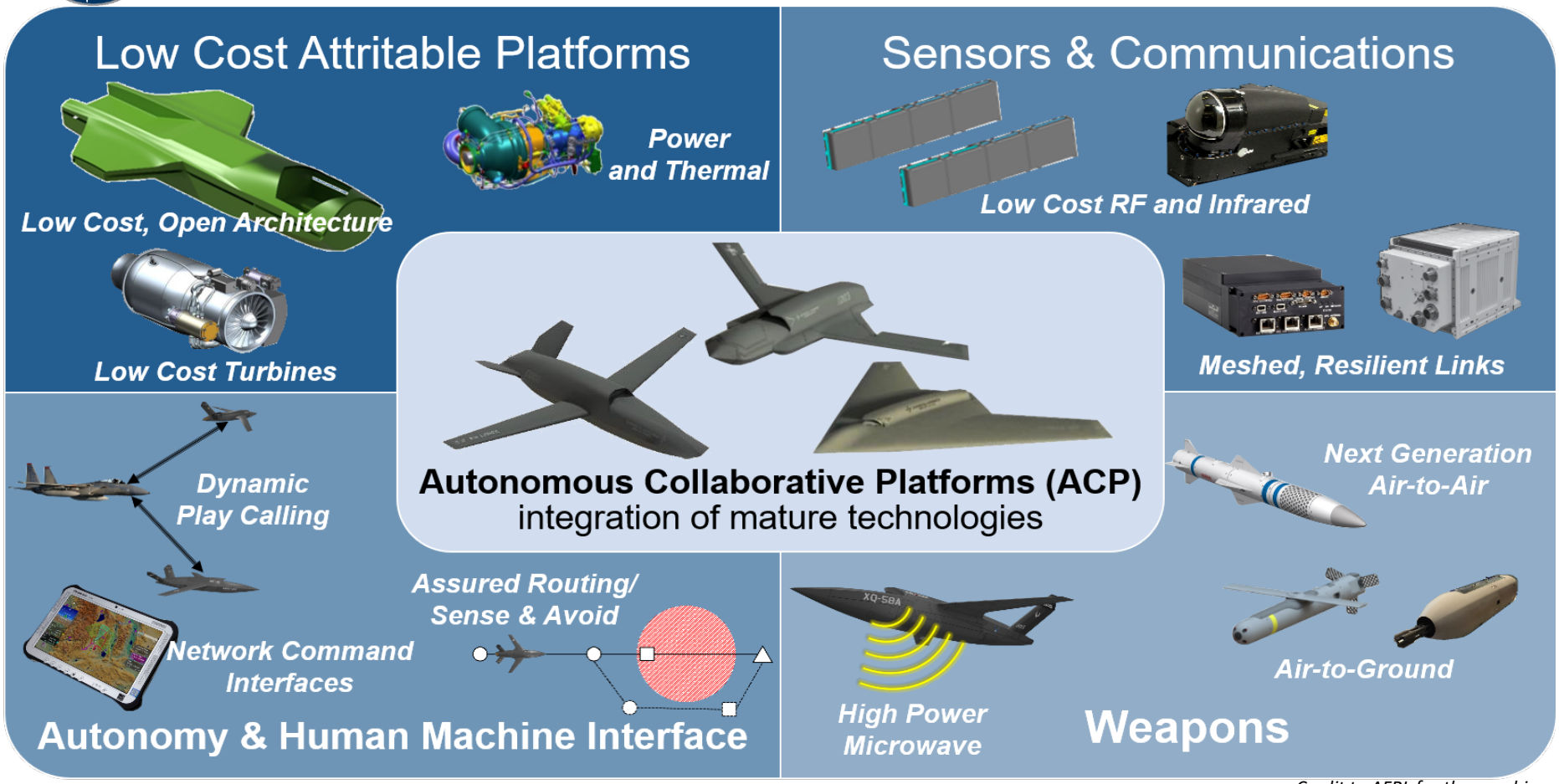
Today: A binary choice



Near future: Expand the USAF's options



Multiple integrated initiatives



Credit to AFRL for the graphic

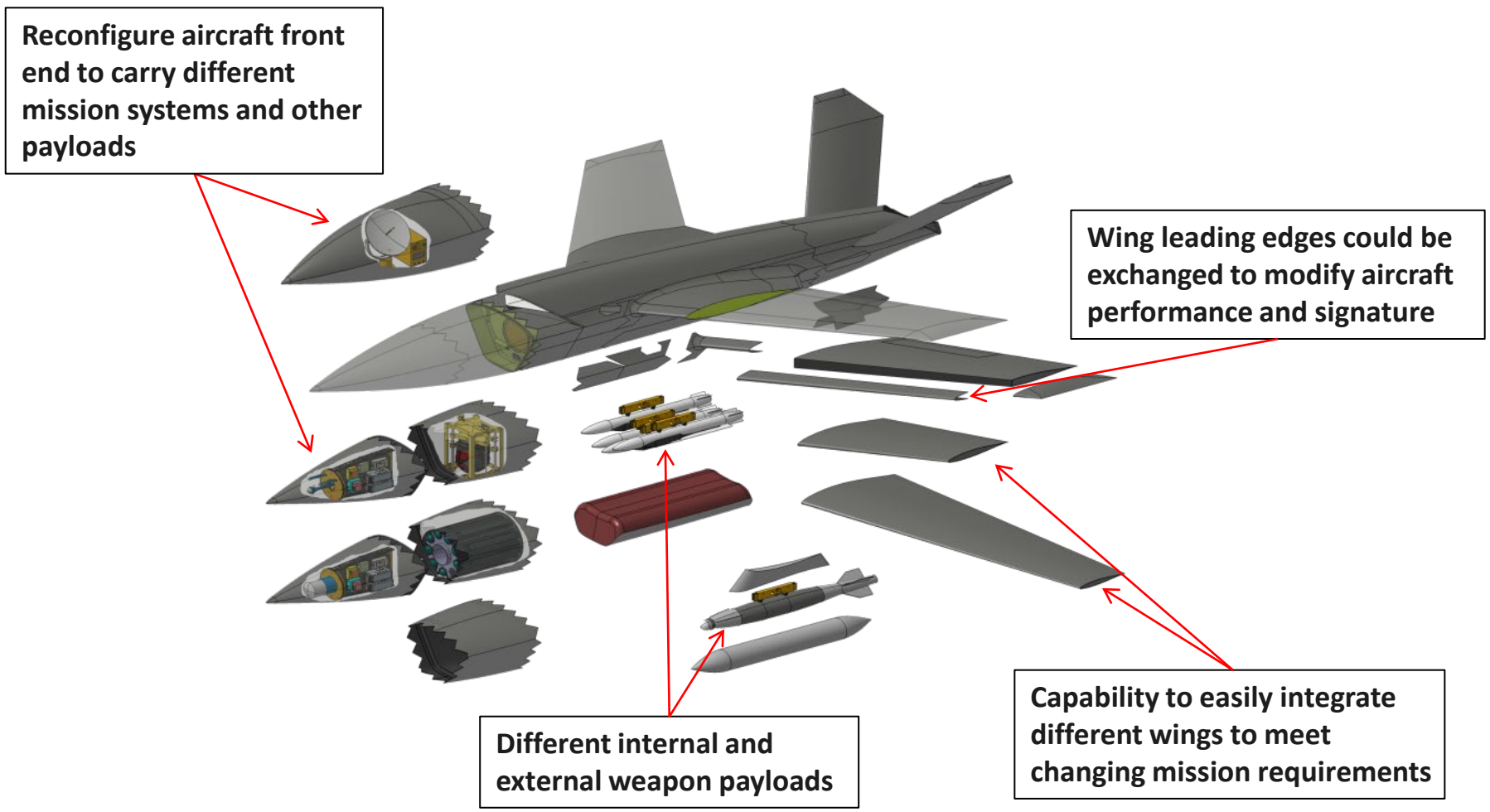
- **ACP:** Creating autonomous technologies, airframes, propulsion, sensors & interfaces, mission systems
- **LCAAT:** Providing vehicle concepts, methods, and tools for designing A/R UAVs; includes Low Cost Attritable Strike Demo (LCASD) Joint Capability Technology Demonstration which developed the XQ-58A
- **Skyborg:** Developing AI architecture and accompanying software for a family of A/R UAVs

Payload, range, and affordability

- **A/R UAVs will not require expensive depot maintenance and other periodic sustainment, few flight hours for peacetime training**

	Range (takeoff to recovery)	Payload in Pounds	Launch and Recovery	Average Unit Cost	Cost per Flying Hour Compared to F-16
F-16C fighter	Air refuellable	16,000 external carriage	Long, improved runways	About $70 million	Estimated $21,000
Medium-large UAV (Valkyrie) with limited mission systems	3,000 nm	600-1,200+ internal, could include: ▪ Sensors ▪ Non-kinetic mission systems ▪ Decoy ▪ Comm node	Rocket assisted takeoff (RATO), parachute recovery; may use runways of 5,000’ or less	$2-3 million	Less than 10%
Medium-large UAV (Valkyrie) with additional mission systems and variants	3,000 nm	600-1,200+ internal, could include: ▪ Sensors ▪ Non-kinetic mission systems ▪ Air-to-air missiles ▪ Air-to-ground weapons	RATO, parachute recovery; may use runways of 5,000’ or less	$10-20 million depending on mission systems	Less than 10%

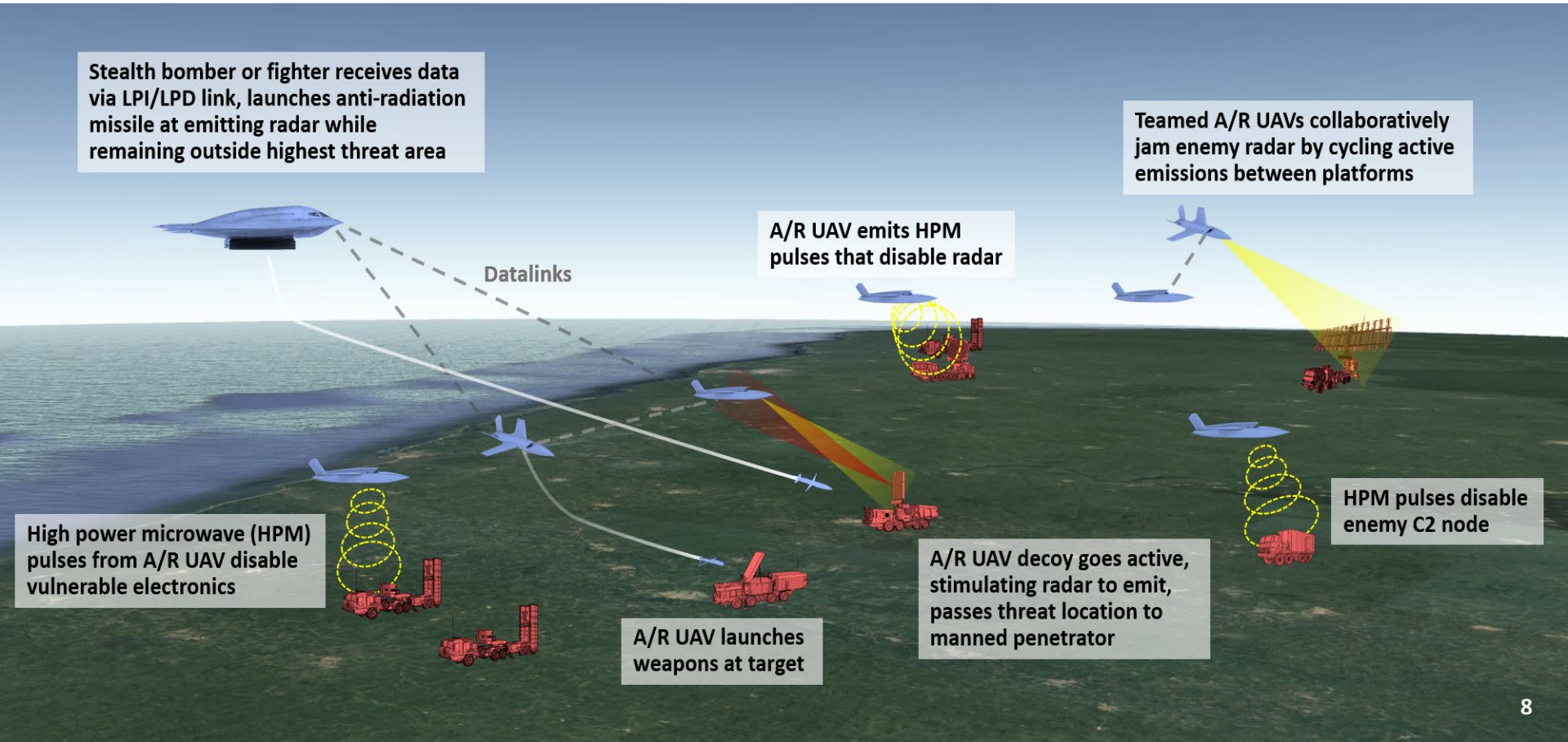
Illustrating modularity



- **Creates potential to accelerate manufacture of variants plus rapidly reconfigure in the field between sorties for different missions**

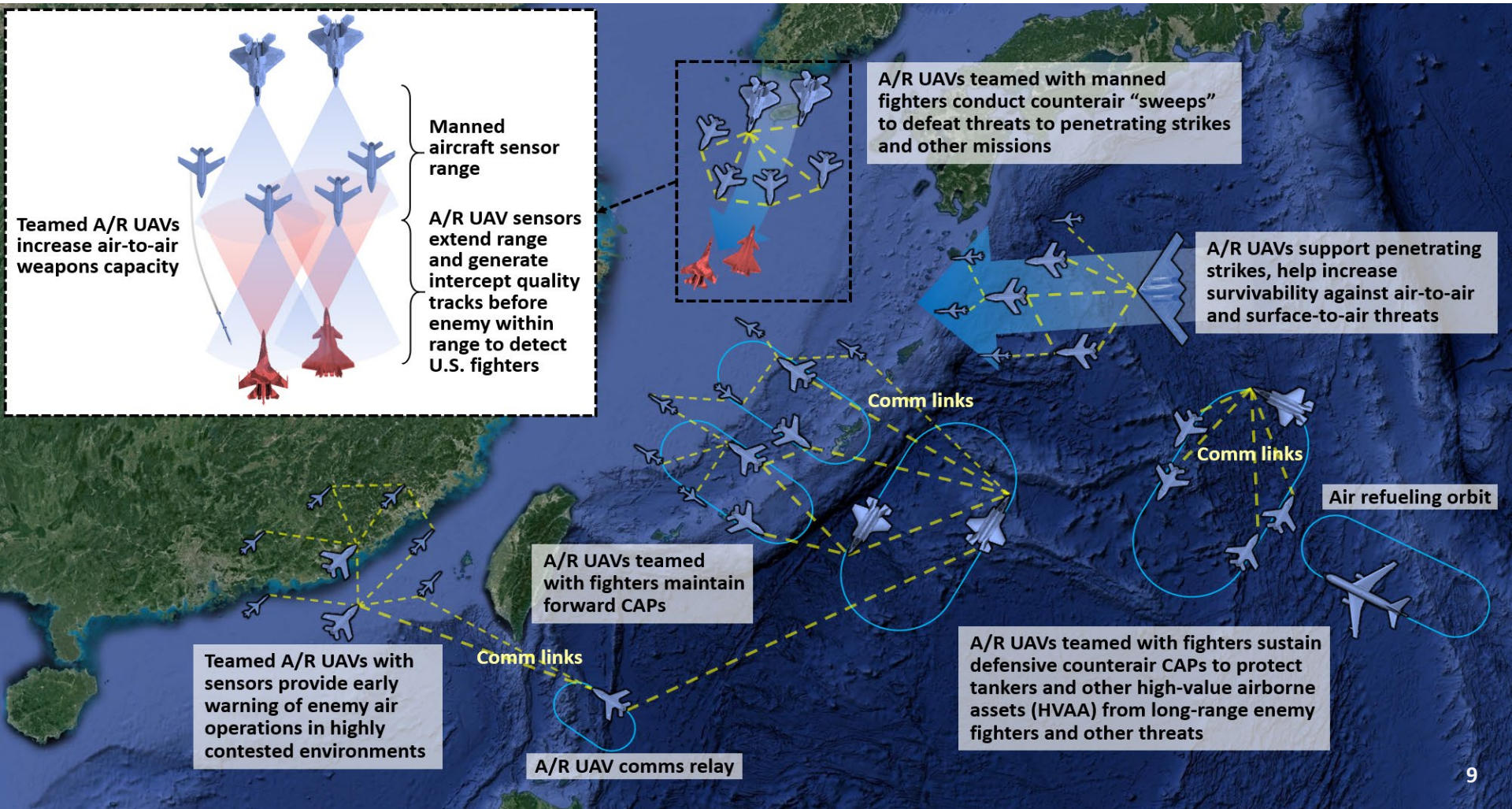
Increase survivability and lethality

- **Act as reusable jammers, disrupt/disable/destroy scores of threats per sortie with high power microwaves, attack targets with small anti-radiation missiles, cue strikes by other aircraft**



Offensive & defensive counterair operations networked with 5th generation aircraft

- Increase the USAF's operational risk tolerance in contested areas
- Multiply effects created by 5th gen combat aircraft, not replace them



Recommendations and insights

- The USAF should buy low-cost A/R UAVs in significant numbers to increase its combat capacity, lethality, and survivability in contested environments

- A/R UAVs will be complementary, force-multiplying capabilities, not replacements for 5th gen stealth aircraft needed to maintain the USAF's advantage over peer adversaries

- Given their modest payloads, A/R UAVs could have the greatest combat value if used for electromagnetic warfare, persistent C2ISR, and other non-kinetic missions that take advantage of their force-multiplying potential

Recommendations and insights (continued)

- The low cost and modularity of A/R UAVs will improve the USAF's ability to rapidly innovate, operationalize advanced technologies to meet changing requirements, and speed new capabilities to warfighters
- The Air Force should experiment to explore the value of A/R UAVs and quickly field prototypes to allow warfighters to develop concepts that maximize their warfighting potential
- The Air Force should also determine logistical support and other requirements to launch and recover large numbers of A/R UAVs from distributed theater locations without airfields

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Increase force survivability and lethality

- **Act as reusable active and passive sensors, decoys, and conduct other electromagnetic warfare operations to increase survivability of penetrating combat aircraft and weapons**