

**MITCHELL INSTITUTE**  
for Aerospace Studies



**An Industrial Base Vector for  
Building an Agile Force  
An Imperative for Speed and Adaptation**

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# Overview

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## **Decades of seeking a “smaller but better” offset advantage has shaped the aerospace defense industrial base structures and business models**

- The desire to pursue cost savings has pushed this dynamic to the extreme
- Industry has shaped itself to these market dynamics
- The aerospace defense industry does not have the design team experience or capacity to rapidly field the force design of future that can deliver a new offset

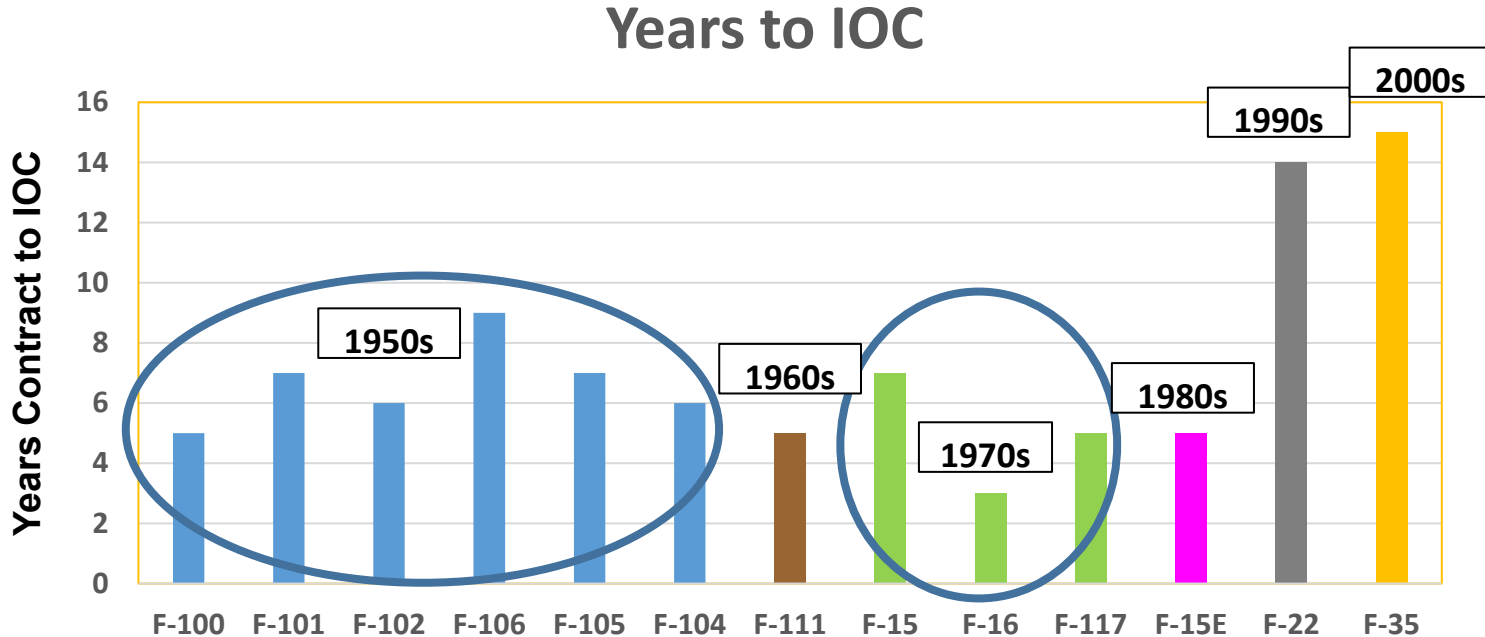
## **Mitchell Institute’s report addresses three trends in the aerospace defense industrial base:**

- 1. Consolidation of the industry:** Scarce new-start opportunities have caused extreme contraction, decreasing competition within the industry
- 2. Integration engineering:** With few new design opportunities, industry expertise has shifted away from innovation and to system integration
- 3. Sustainment as a primary profit center:** Industry’s main and most reliable profit centers are in long-term sustainment – not innovation and production

**These trends undermine the nation’s ability to compete, deter, and win against any peer adversary**



# The pursuit of “game-changing” technology in smaller force has increased time to field

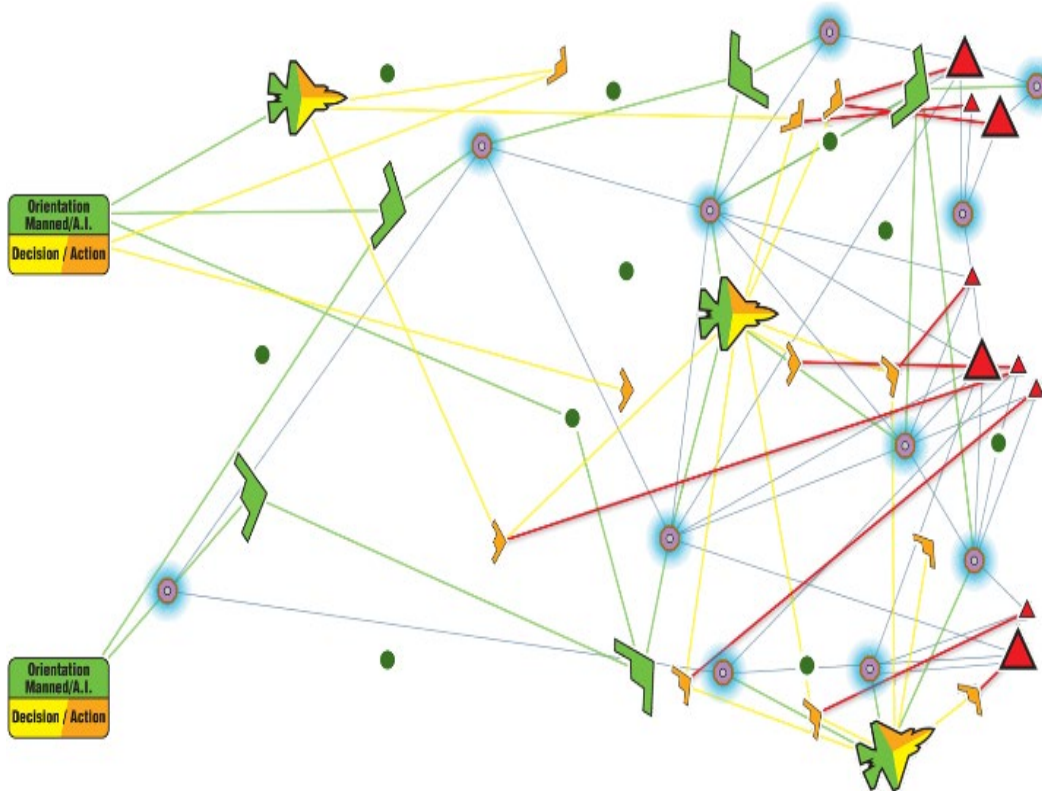


- In the 1950s, there were 19 fighter aircraft companies
- Today, there are only 2 fighter aircraft companies

Extended developmental and fielding timeframes risks capability  
obsolescence



# Advanced capabilities no longer provide decades of advantage against a technological peer



## DOD Must Rebalance Force Design Attributes of a New Offset Strategy:

- Quality / Capability
- Quantity / Capacity
- Diversity
- Complexity
- Adaptation
- Speed

Against a technological peer, new asymmetries must be pursued – speed and adaptation will provide the advantage



## **“Smaller but better” offset strategy fields advanced capabilities too expensive and too late to be relevant against a technological peer**

### **Current offset strategy in peer system warfare**

**Pursuit of advanced capability extends time to field**

**High-cost platforms limit force size and diversity**

**Small fleets limit operations and increase predictability**

**High value, low density force shifts balance of design to survivability**

**Long developmental cycles create predictable force presentation**

**Future force design attributes must be re-aligned to achieve new offset advantages**



# 2<sup>nd</sup> Offset shaped today's defense industry through diminished new business opportunities

- Industry has adapted to the lack of competition opportunities through extreme consolidation
- USG is an unreliable program partner – unstable requirements, funding, rate, production quantities break trust
  - Disincentivizes companies from R&D
  - Encourages franchise extension
- Scarce new-starts have shaped impacted industry behavior
  - Each competition is existential, increasing protests
  - Partnering becomes a key competition and political strategy

## Consolidation of U.S. defense manufacturing, 1993-2007

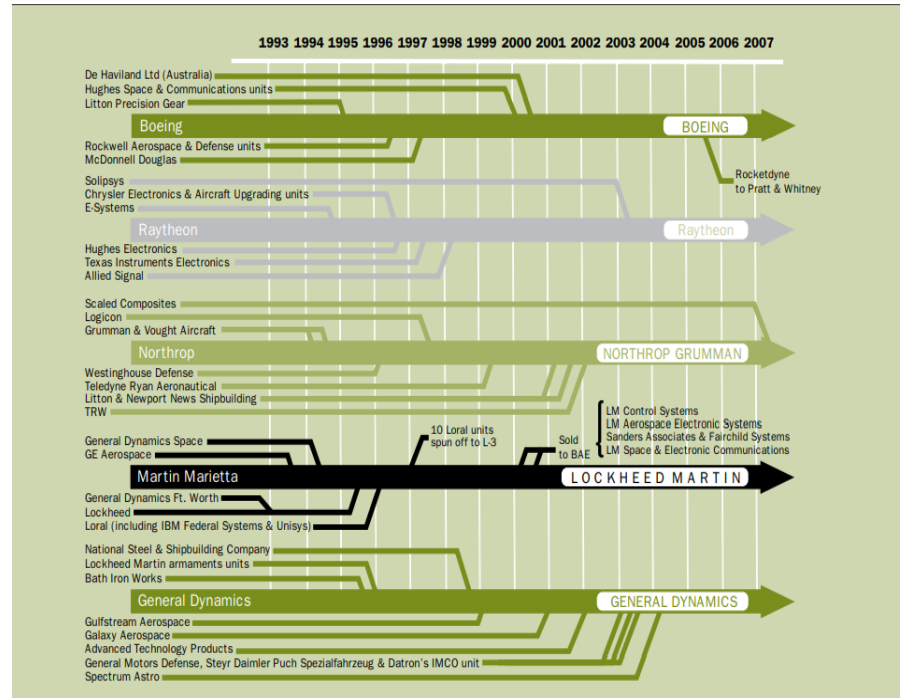


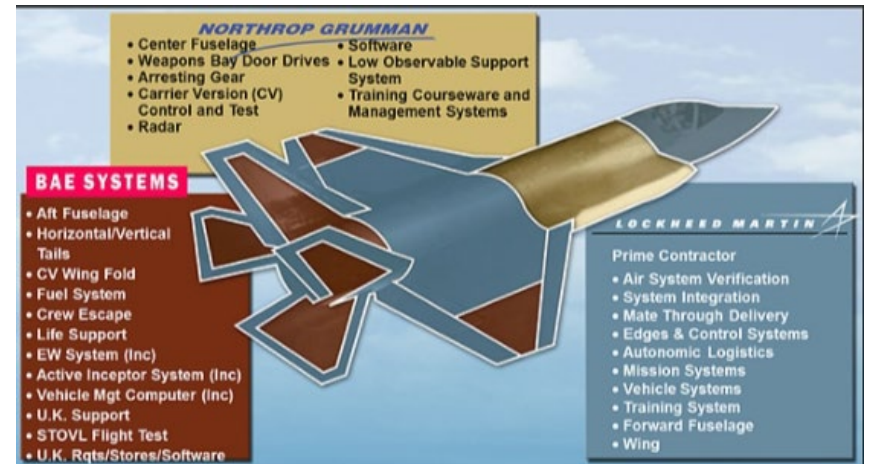
Image credit: Barry D. Watts, *The U.S. Industrial Base: Past, Present, and Future*, [2008.10.15-Defense-Industrial-Base.pdf](http://2008.10.15-Defense-Industrial-Base.pdf) ([csbaonline.org](http://csbaonline.org))

**“What we got was ... few large companies, less effective competition. We would have been better off with more, smaller firms that with a few large ones.” – Sec. William Perry**



# Industry has Shifted to the Lead System Integrator Model

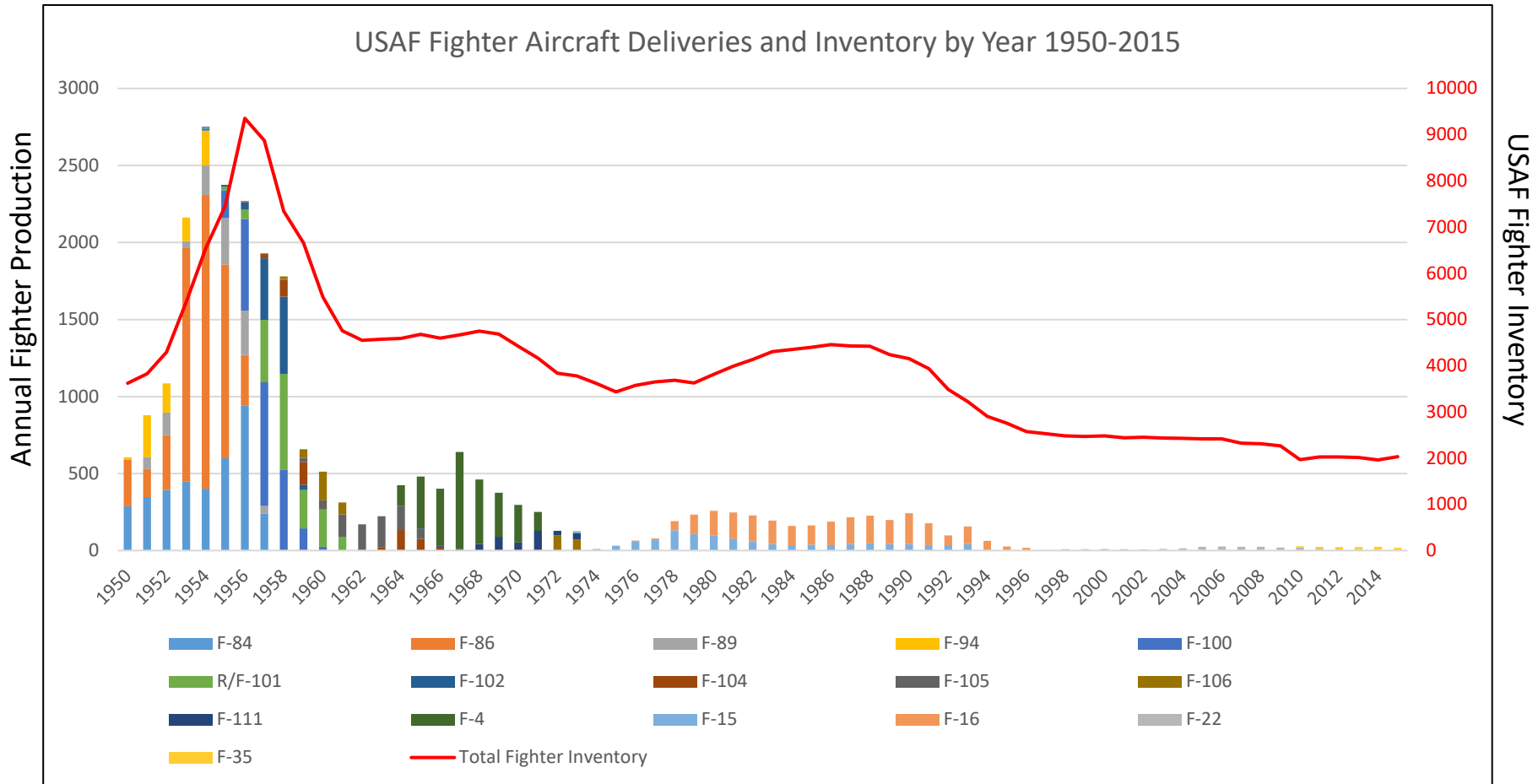
- **Not enough of a demand signal for design innovation through new-starts**
  - Weight of industry's engineering talent is imbalanced
- **Integration is crucial to mating both physical and software design**
  - But integration alone is not enough
- **Focus on integration limits innovation because it is limited to legacy platform**
  - Barrier to advancing capability



**Integration skills will be crucial to rapid adaption of the force, whether through upgrades or production – but integration alone is not enough**



# Scarce new-aircraft production opportunities have shifted industry profit centers to legacy sustainment



**Scarce development and production opportunities have redirected industry to focus on sustaining the past, not inventing the future**





# **RISK:** The defense industry is not structured or incentivized to field the new offset

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- **Consolidation decreases competition**
  - Diminishes design innovation and diversity - design teams need holistic experience from iteration & repetition
  - Scarce new-starts have adversely affected design teams' depth and creativity, jeopardizing industry's ability to maintain standing teams
- **Integration skills dominate engineering talent base**
  - Integration is not innovation – integration is ultimately limited by existing systems
- **Sustainment as a primary profit center disincentivizes innovation and new designs**
  - Long lifecycles provide long-term, reliable profit centers – and predictable force presentations
  - Sustainment encourages extension of franchises

**Acquisition reform is not sufficient to reshape and rejuvenate the aerospace industrial base**



# Recommendations (1)

**1. The Air Force should expand the defense aerospace industrial base through increased new-start competitions and prototyping programs by:**

- Incentivizing rapid technological development
- Presenting opportunities to new industry entrants
- Providing ongoing, competitive experimental prototype programs
- Avoiding future joint aircraft programs



**An expanded aerospace defense base means more competition, innovation, and design diversity to provide the nation strategic depth**

## Recommendations (2)

**2. The Air Force should enhance the integration skills of design teams by pursuing a strategy of rapid adaptation by:**

- Normalizing open systems, mission integration, containerization, and other technologies to create flexible and adaptive weapon systems
- Promoting the development of mission integration tool sets



Notional F-35 Example

**Integration experience is crucial to executing the strategy of rapid technological and operational adaption**



## Recommendations (3)

### 3. The Air Force should increase the number of competition and program opportunities to return aerospace's major profit centers into production by:

- Increasing the frequency of new-starts and maintain multiple hot production lines
- Prioritizing new-starts over service life extensions or new-old to innovate and maintain targeted fleet age
- Normalizing and reward adaptive and affordable manufacturing technologies



Republic F-105 production plant, Hagerstown, MD

**Shifting profit centers back to production will reshape industry towards rapid innovation, development, and fielding**



## Summary

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The nation can no longer rely on pursuing a “smaller but better” force that takes decades to field. Instead, the nation must pursue a rebalanced force design that prioritizes adaptation and speed to provide an asymmetric advantage. This new offset strategy will demand a change to the structure and business models of the aerospace defense industrial base:

- 1. The Air Force should expand the defense aerospace industrial base through increased new-start competitions and prototyping programs**
- 2. The Air Force should enhance the integration skills of design teams by pursuing a strategy of rapid adaptation**
- 3. The Air Force should increase the number of competition and program opportunities to return aerospace’s major profit centers to production**

**The Air Force should use normal market incentives to reshape the aerospace industrial base to field a new force design**



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