Warfighting and Disruptive Technologies: Disguising Innovation

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Explaining Navy and Marine Corps Disruptive Innovations from 1899 to 2001

John F. Kennedy School of Government, Harvard Doctoral Thesis 2001

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Williamson Murray, Editor

Achieving Major Warfighting Innovations

Two Questions:

How can senior military leaders achieve a **disruptive** innovation when they are heavily engaged around the world and they are managing **sustaining** innovations?

What have been the external sources of **disruptive** and **sustaining** innovations?

Technological Innovation vs. Doctrinal Innovation

Problem of Old Typology

Technology vs. Doctrine

No unified theory that could explain:

How major innovations were adopted and fully exploited first by an entity other than the inventor of the new technology.

Different Typologies: Technology-Driven

- Vincent Davis – *The Politics of Innovation: Patterns in Navy Cases,* 1967
- He describes cases where new technologies were used to help perform existing missions better and not to change them radically.
  - *Introduction of atomic bombs into the U.S. naval strike force.*
  - *Introduction of nuclear propulsion into the U.S. submarine force.*
  - *LT Sims' advocacy of continuous aim gunfire.*

Different Typologies: Doctrine-Driven

- Stephen Rosen – *New Ways of Warfighting,* 1991
- He describes cases where old and new technologies were used with new operational procedures to perform a new way of war.
  - *Blitzkrieg*
  - *Carrier Warfare*
  - *Amphibious Warfare*

Different Typologies:
Hybrid: Doctrine-Technology Driven

- Captain Bradd Hayes, USN and CDR Douglas Smith, USN, *Politics of Naval Innovation,* 1994
- They could not determine which theory of innovation -- technology or doctrine -- was more dominant.
  - *Cruise Missiles and the Tomahawk*
  - *Aegis*
- Conclusions:
  - *Technology development precedes doctrine development.*
  - *Programs that have the potential to be truly innovative will have a better chance of being fielded if promoted as evolutionary rather than revolutionary systems.*

Different Typologies:
Hybrid: Doctrine-Technology Driven

- Jeffrey Isaacson, Christopher Layne, and John Arquilla, *Predicting Military Innovation*, Rand, 1999
- They describe cases whereby innovation is manifested by new warfighting concepts and/or means of integrating technology.
- New means of integrating technology may or may not include revised doctrine.
  - *Israeli Defense Forces (1948-1982)*
  - *North Vietnamese Army (1965-1970)*

Old Typology for Defining Technological Innovation

Incremental vs. Radical/ Breakthrough

Old Typology for Defining Innovation

Problem of Old Typology

- **Why did successful companies that were well managed and investing in new technologies lose market dominance or fail entirely?**

- **Why did successful militaries, such as post World War I France, that were investing in new technologies, such as the Maginot Line, fail to anticipate and effectively counter the German Blitzkrieg?**

Architectural Innovation

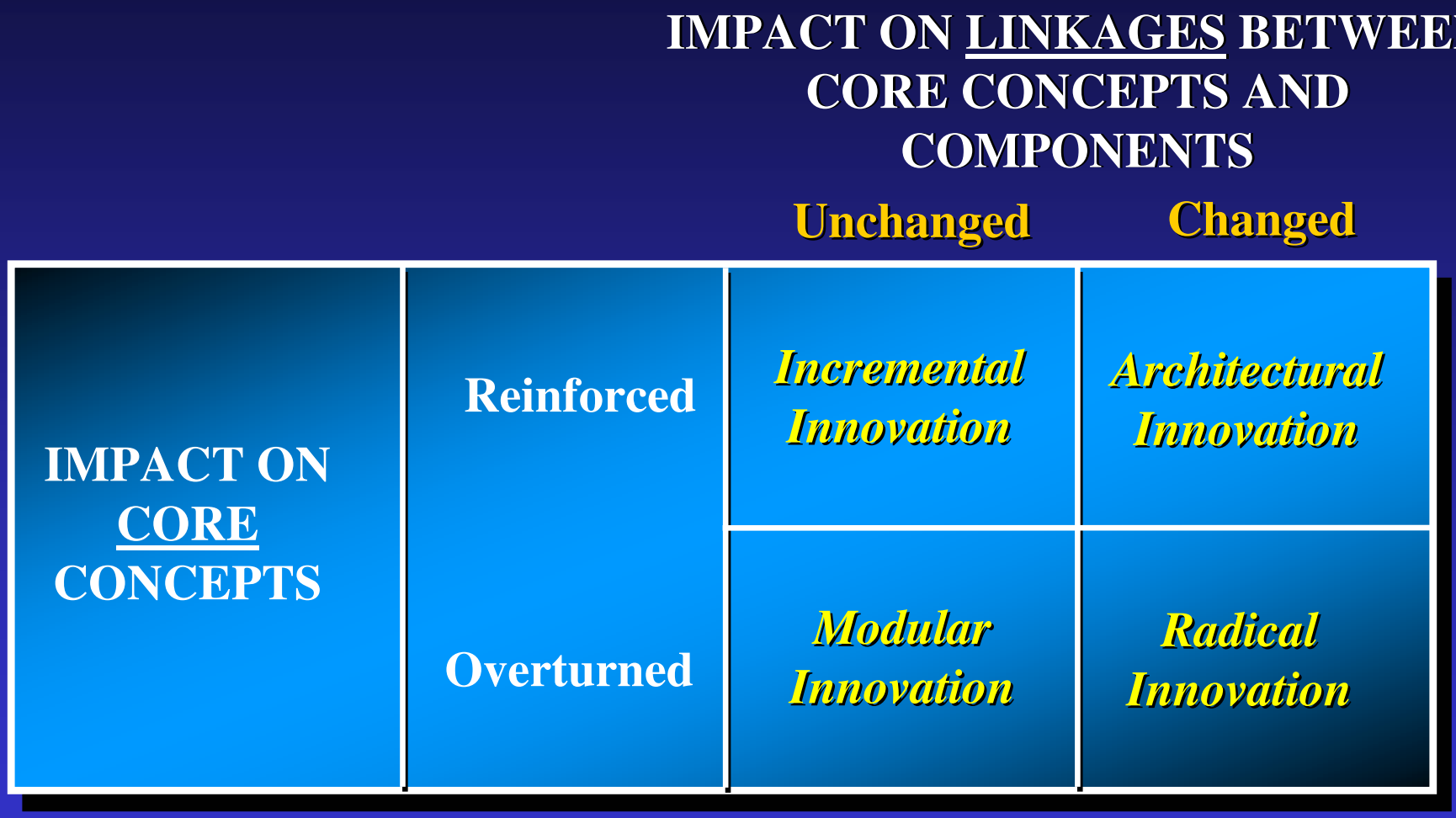
Rebecca Henderson and Kim Clark

- New model explained why insignificant improvements in technology could result in a major new innovation.
- Components of technology stayed the same.
- Linkages among components changed in novel ways.

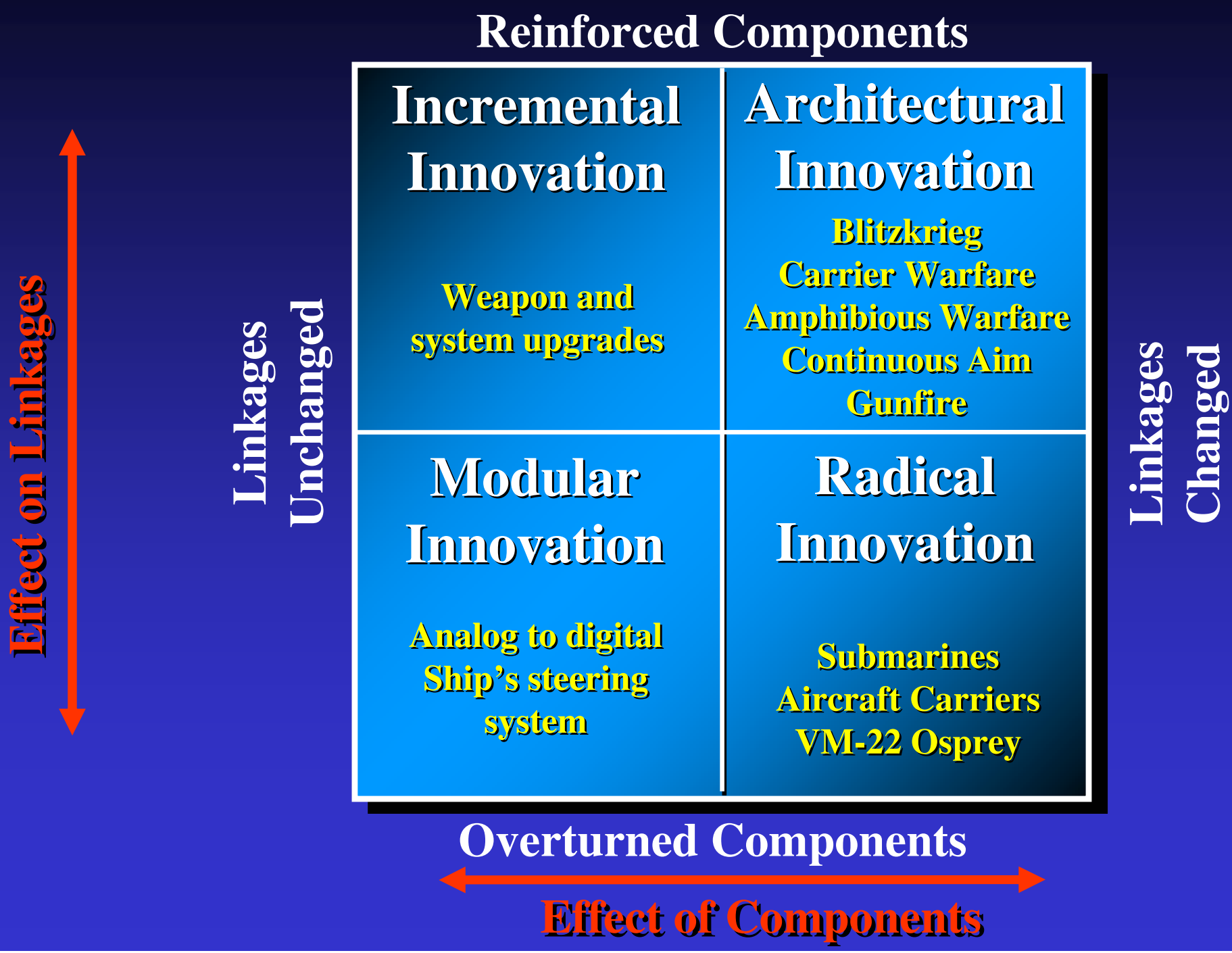
Architectural Innovation Theory

- The importance of this theory is that it explains why seemingly insignificant improvements in technology can result in a new way of warfighting.
- Linkage innovation (doctrine) and component (technology) innovation are both difficult.
- This explains why militaries that dominate a new generation of technology often fail to incorporate this technology in a novel doctrine that leads to a new way of war.

A New Typology for Defining Innovation



A New Typology for Defining Technology & Doctrine



Understanding Military Innovations

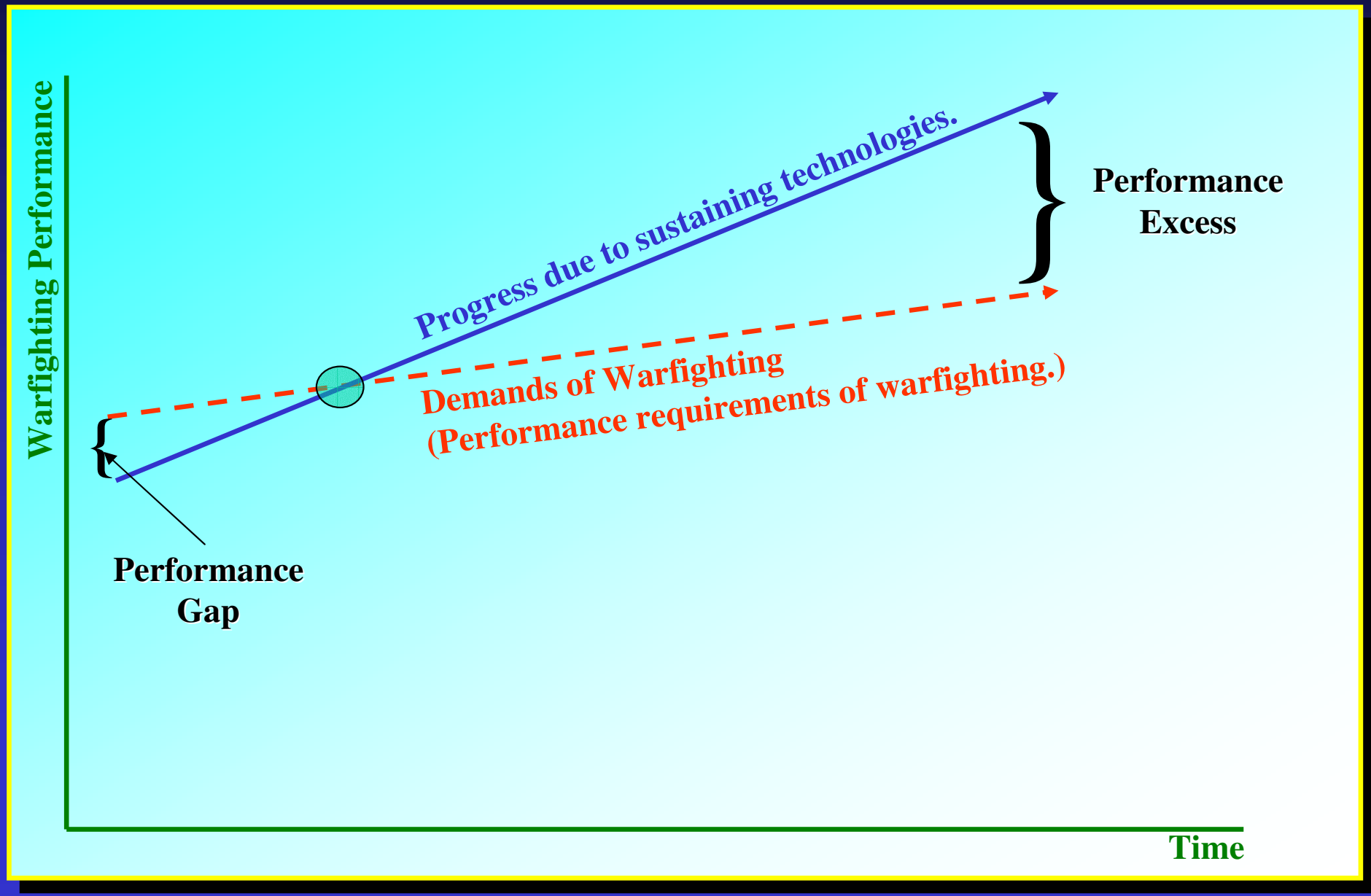
Two Different Ways:

- **In terms of their trajectory performance along paths that warfighters either value or do not value**
- **In terms of their parts – components and linkages**
  - **Components are core technologies or systems that are being either reinforced or overturned**
  - **Linkages are relationships between components that are being either changed or left unchanged**

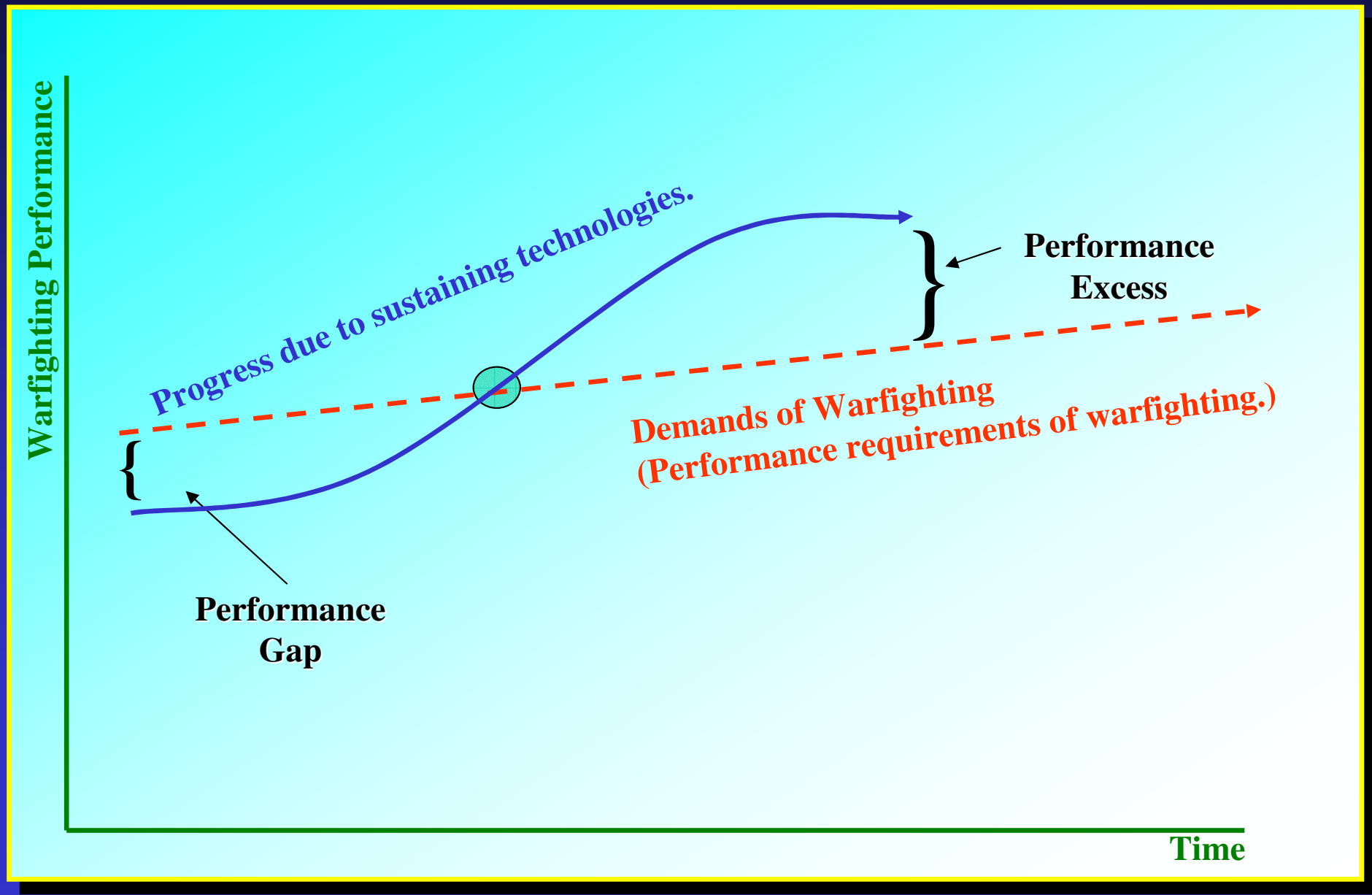
Trajectory Performance Sustaining Innovation

- **Sustaining improves performance of established warfighting methods along an established trajectory that the warfighters currently value.**

Trajectory Performance Sustaining Innovation



Trajectory Performance Sustaining Innovation



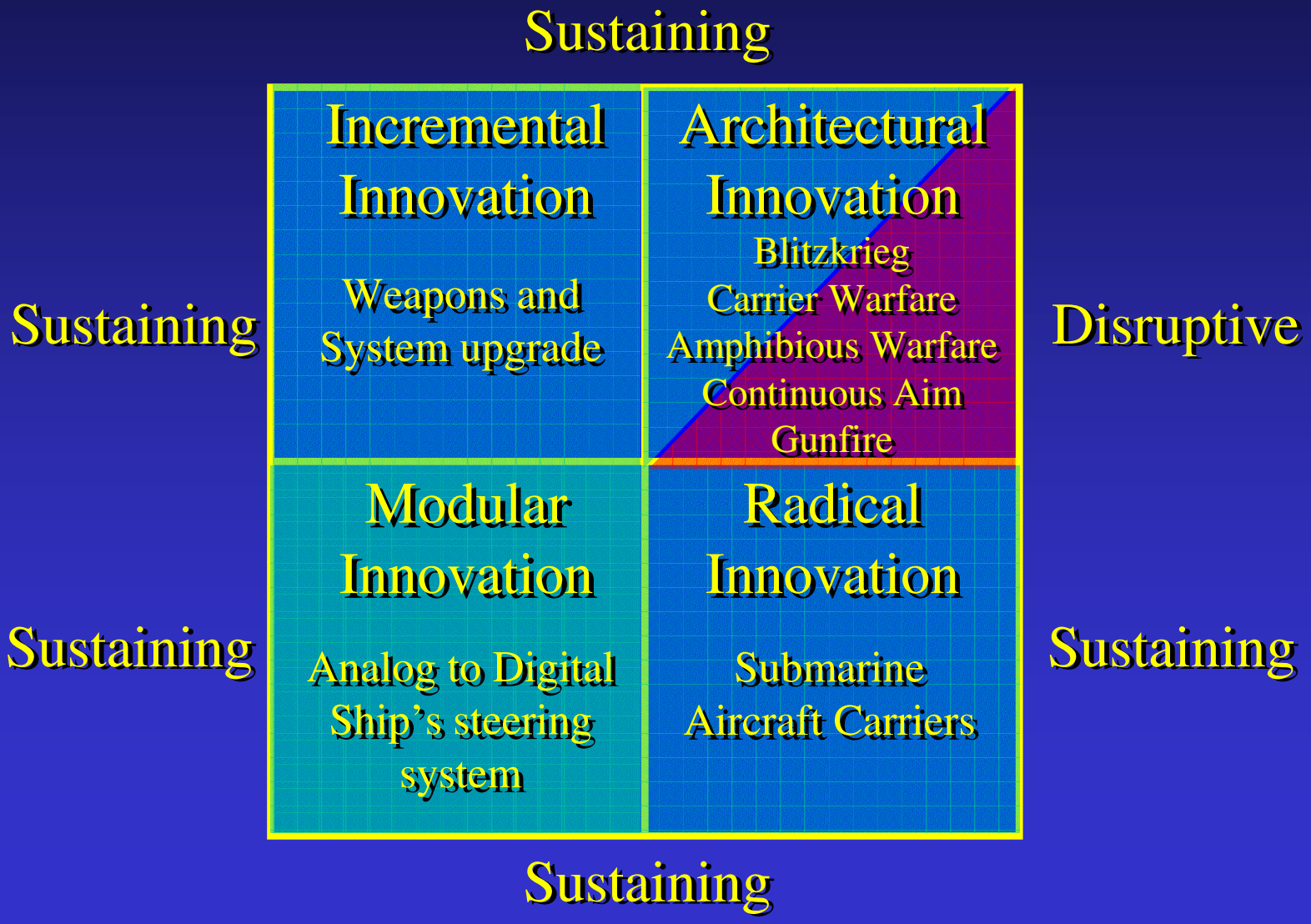
Components and Linkages Sustaining Innovation

- **Military leaders focus on creating new radical innovations that can replace existing components, but not on changing the linkages among components.**
  - **For example, the aircraft carrier…a radical technical innovation.**

Components and Linkages Sustaining Innovation

- **Military leaders focus on maintaining existing linkages among components.**
  - **For example, battleship Admirals describe the role of aircraft carriers as extended "eyes" for battleships**
  - **Aircraft carriers in line of column with battleships**

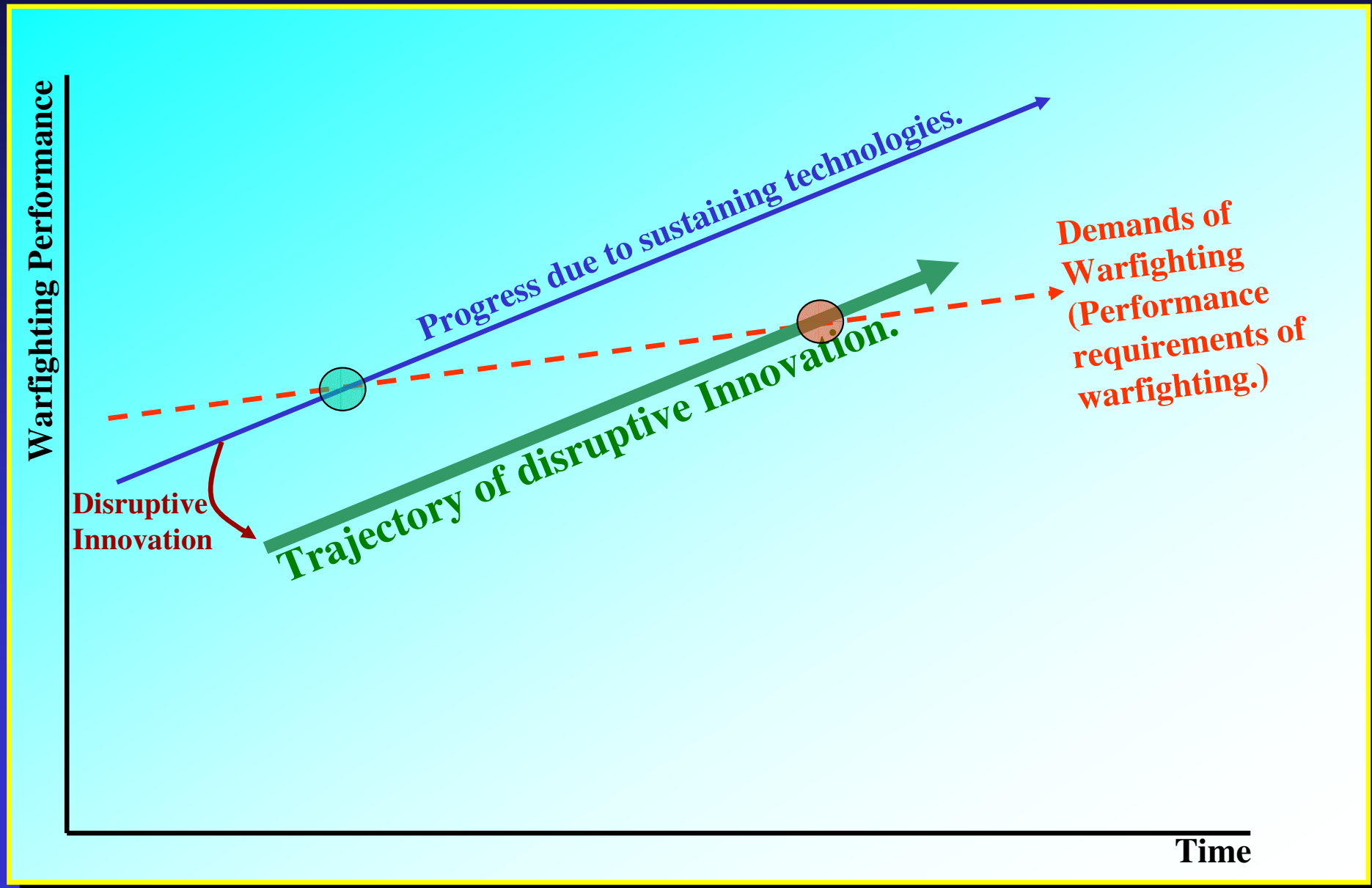
Disruptive Architectural Typology for Defining Technology & Doctrine



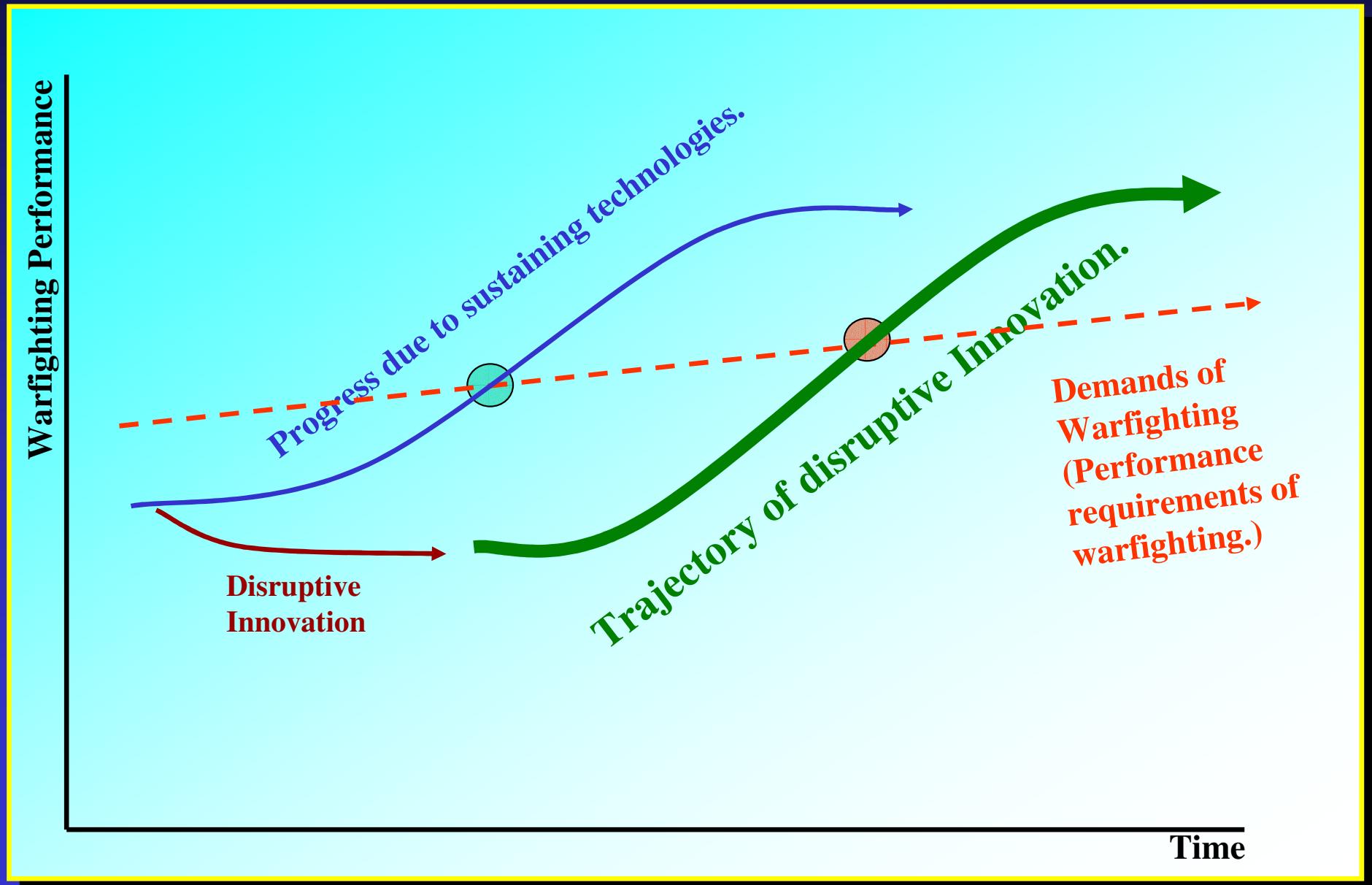
Trajectory Performance Disruptive Innovation

- **Disruptive innovation improves performance along a trajectory path that traditionally has not been valued.**

Trajectory Performance Disruptive Innovation



Trajectory Performance Disruptive Innovation



Components and Linkages Disruptive Innovation

- **Military leaders focus on changing the way components are linked in novel ways while leaving core design concepts of the technology (and the knowledge underlying them) untouched.**
  - **For example, carrier warfare and blitzkrieg**

Disruptive Innovation
Novel Linkages of Existing Components

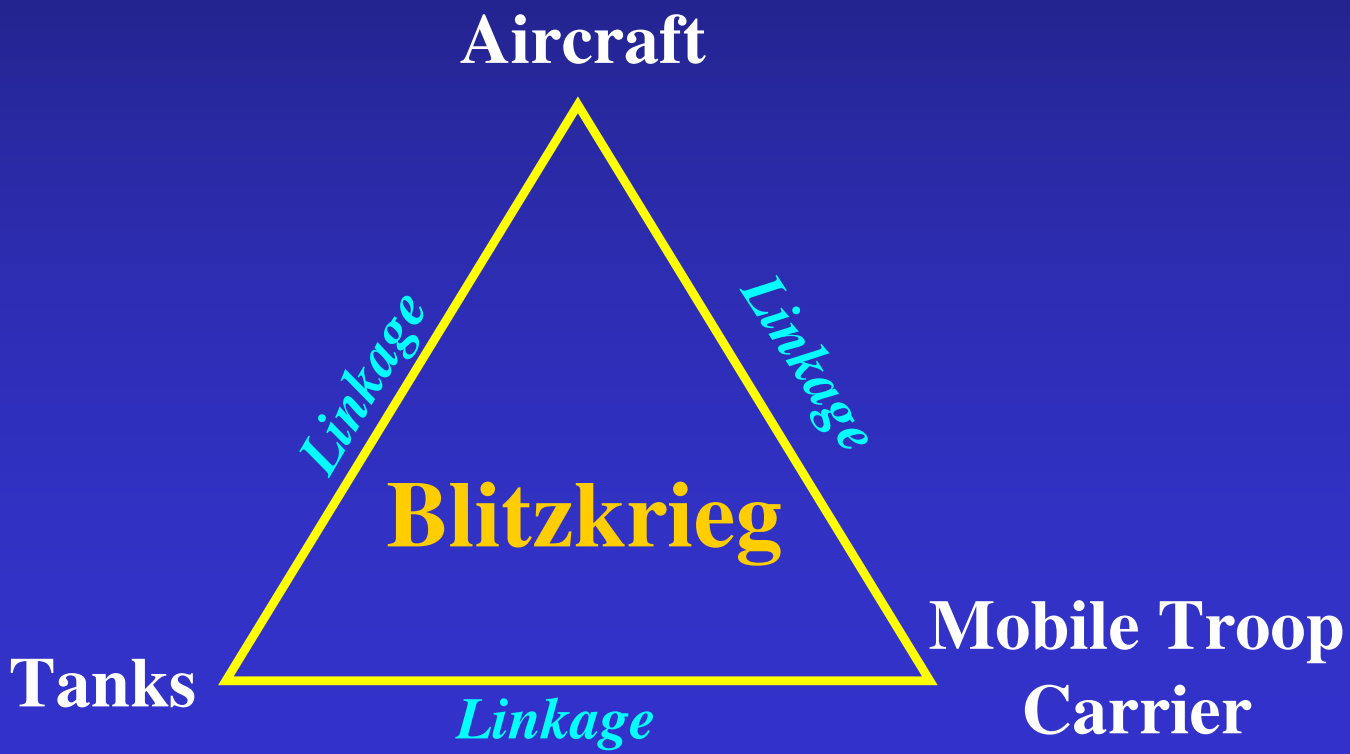
- **Carrier Warfare**
  - **Combined existing core technologies in novel way**
    - **Carriers, aircraft, arresting/take-off gear**
- **Blitzkrieg**
  - **Combined existing core technologies in novel way**
    - **Tanks, aircraft, radios, mobile troop carriers**

Disruptive Innovation

Novel Linkages of Existing Components

Linear Armored Warfare

Tanks —— Aircraft —— Mobile Troop Carrier



Sustaining vs. Disruptive Innovation

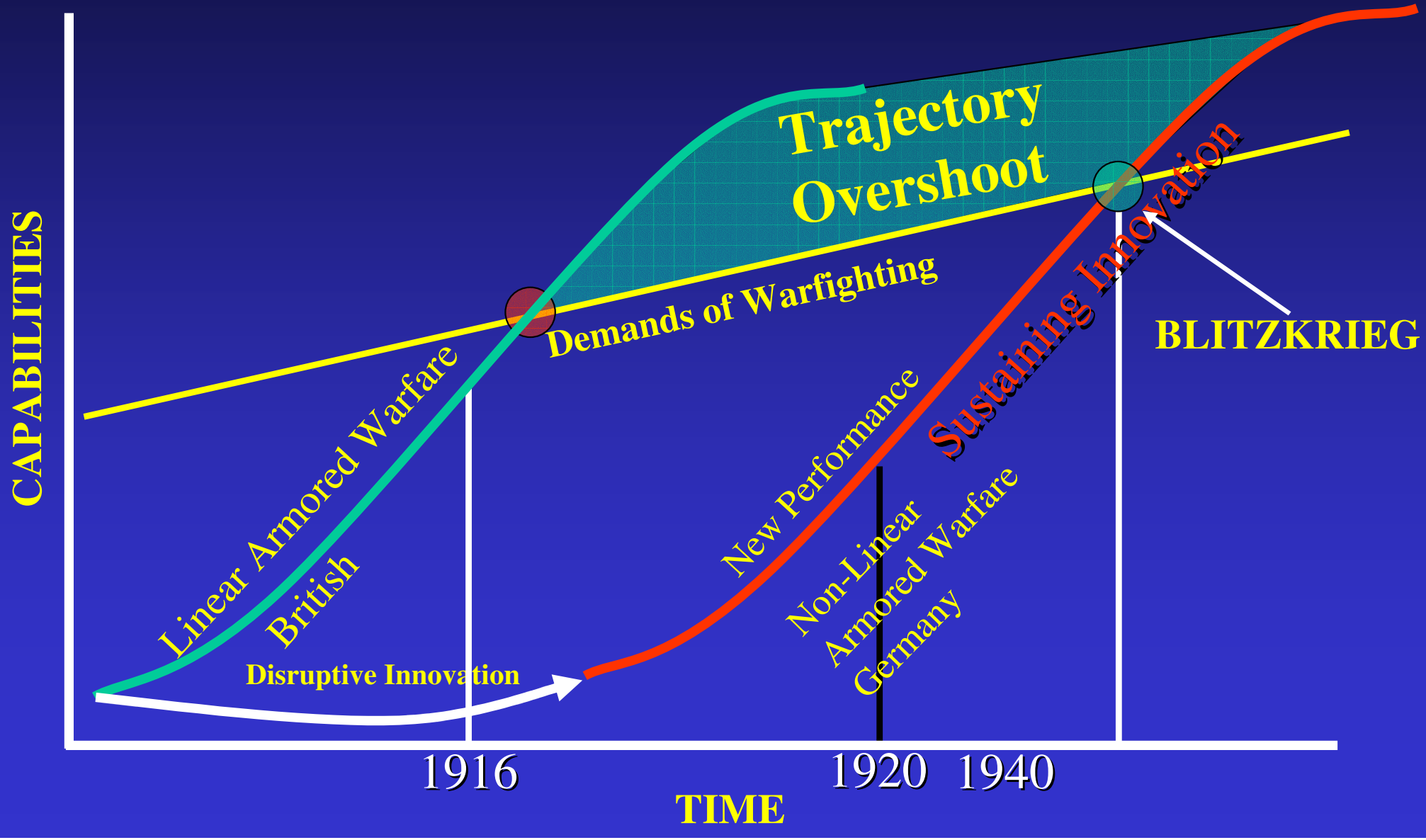
- ***Sustaining*** **– Sustaining improves performance of established warfighting methods along an established trajectory that the warfighters currently value.**

- ***Disruptive*** **– Disruptive innovation improves performance along a trajectory path that traditionally has not been valued.**

Sustaining Innovation "Overshoot"

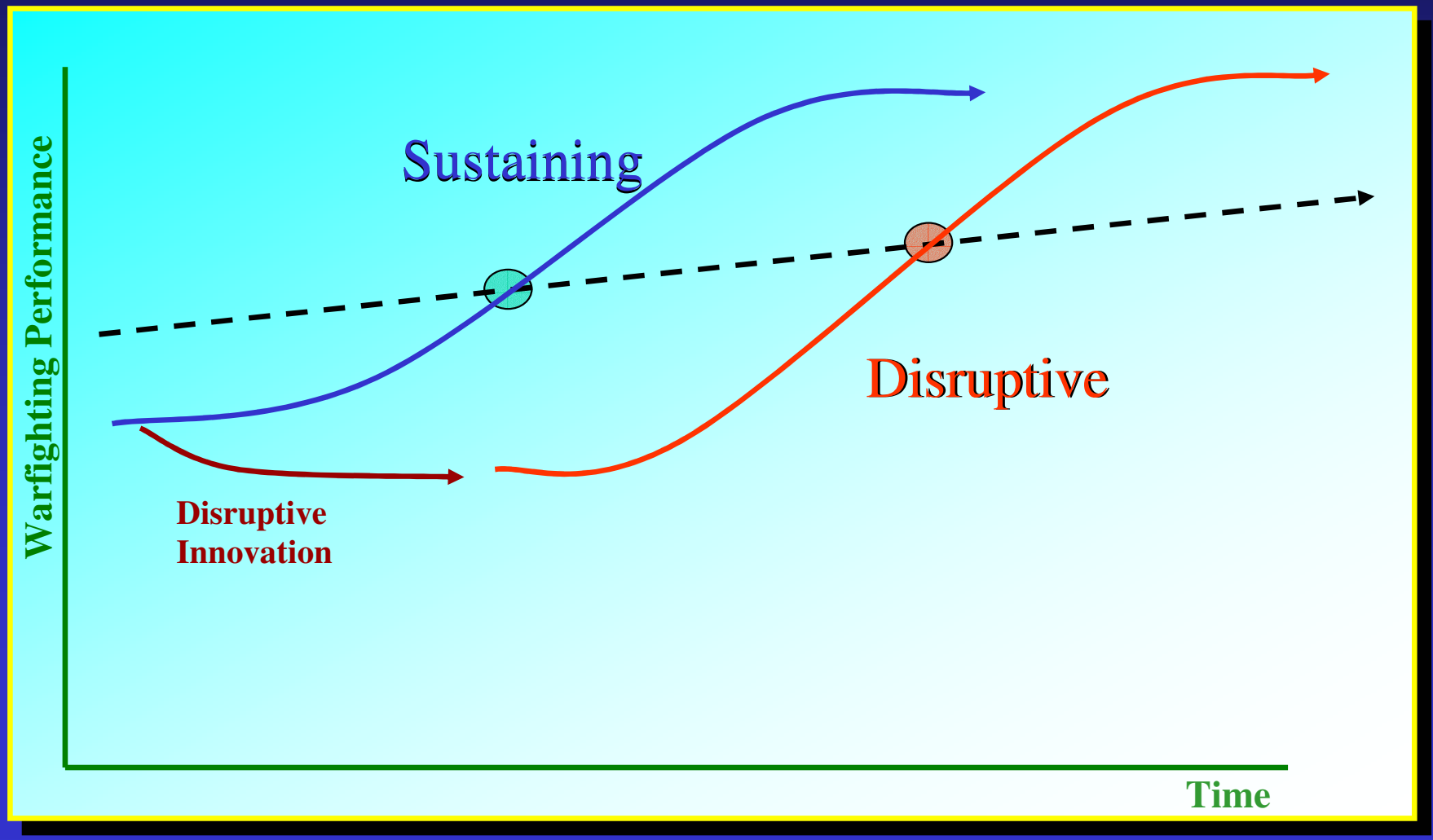
- **Eventually, sustaining innovations will exceed the performance requirements of the traditionally valued way of warfighting (for example, the physical size of Battleships).**

Sustaining vs. Disruptive Innovation
Linear vs. Non-Linear Armored Warfare



Importance of Distinguishing Disruptive and Sustaining

Two different ways to manage.



Naval Champions Managing Disruptive Innovations

- **Engine of change: Why and When**
  - **Civilian intervention**
  - **Inter-service rivalry**
  - **Intra-service rivalry**
- **Throttle of change: How**
  - **Small group**
  - **Disguising**
  - **Zealot**
  - **Support/Promote junior officers**

Naval Champions Managing Disruptive Innovations

- **Engine of change: Why and When**
  - **Civilian intervention -- No**
  - **Inter-service rivalry -- Yes**
  - **Intra-service rivalry -- Yes**

Naval Champions Managing Disruptive Innovations

- **Throttle of change: How**
  - **Small group -- Yes**
  - **Disguising**
    - **Peacetime -- Yes**
    - **Wartime/Defeat -- No**
  - **Zealot -- No**
  - **Support/Promote junior officers -- Yes**

Naval Champions Managing Disruptive Innovations

- **Senior Military Champion establishes Disruptive Innovation Team**
  - **Serves as incubator for redefining warfighting tasks**
  - **Works directly for Senior Military Champion**
  - **For example, in 1933 USMC Commandant General Fuller established a Disruptive Innovation Group comprised of four USMC Majors and a Navy LT for developing amphibious doctrine**

Naval Champions Managing Disruptive Innovations

- **Senior Military Champion disguises innovation**
  - **Promotes as sustaining innovation reinforcing current way of fighting**
    - **For example, Admiral Moffett and carrier warfare**
  - **Protect and nurture nascent disruptive innovation in order to allow maturing**

Naval Champions Managing Disruptive Innovations

- **Senior Military Champion manages political struggle that leads to:**
  - **New stable career paths for younger officers who are committed to the new way of warfighting**
    - **For example, Naval Aviation, Composite Warfare Commander (CWC)**

Naval Champions Managing Sustaining Innovations

- **Senior Military Champion establishes Sustaining Innovation Team**
- **No disguising of innovation**
- **Zealot**
- **Civilian intervention**

Naval Champions Managing Sustaining Innovations

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Naval Champions Managing Sustaining Innovations

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Naval Champions Managing Sustaining Innovations

- **Throttle of change: How**
  - **Small group -- Yes**
  - **Disguising -- No**
  - **Zealot -- Yes**
  - **Support/Promote junior officers -- N/A**

Predictions for Championing Sustaining and Disruptive Innovations

	Disruptive	Sustaining
Engine of change:		
– Civilian intervention	No	Yes
– Inter-service rivalry	Yes	Yes
– Intra-service rivalry	Yes	Yes
Throttle of change:		
– Small group	Yes	Yes
– Disguising	Yes	No
– Zealot	No	Yes
– Support/Promote junior officers	Yes	No

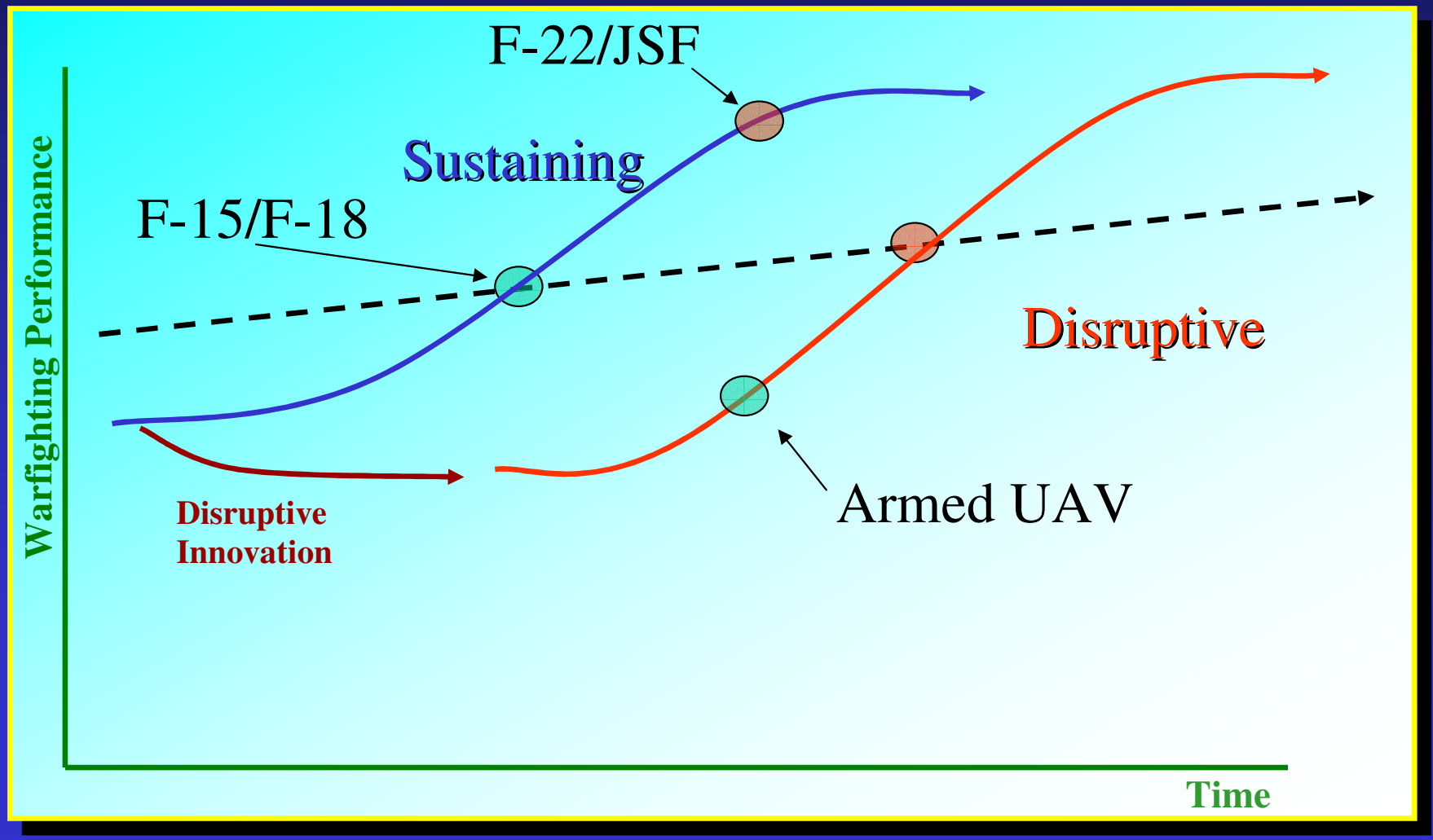
Points to Ponder

- Disruptive and sustaining constructs correlate to what Williamson Murray calls the "revolutionary" and "evolutionary" phenomena of innovation.
- 90 percent of innovations are sustaining in nature and most senior military leaders are adept at championing these innovations.
- 10 percent of innovations are disruptive in nature and most senior military leaders are not adept at championing these innovations.

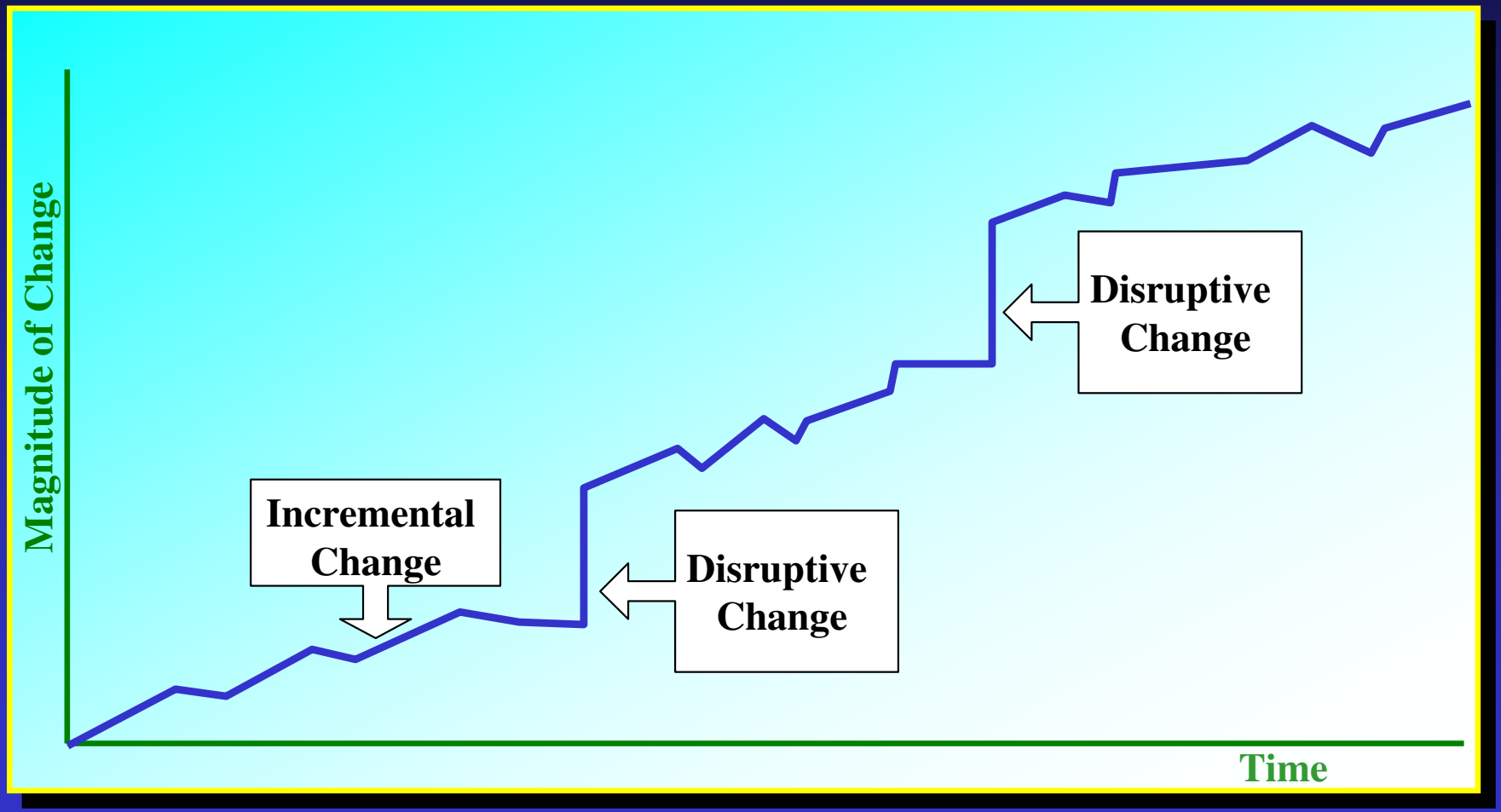
Points to Ponder

- Civilian leaders can help champion sustaining innovations but have failed to champion disruptive innovations.
- Disguising a disruptive innovation as a sustaining innovation is necessary but not sufficient for success.
- Small innovation groups are necessary but not sufficient for disruptive success.

Points to Ponder
Trajectory Overshoot Candidates?



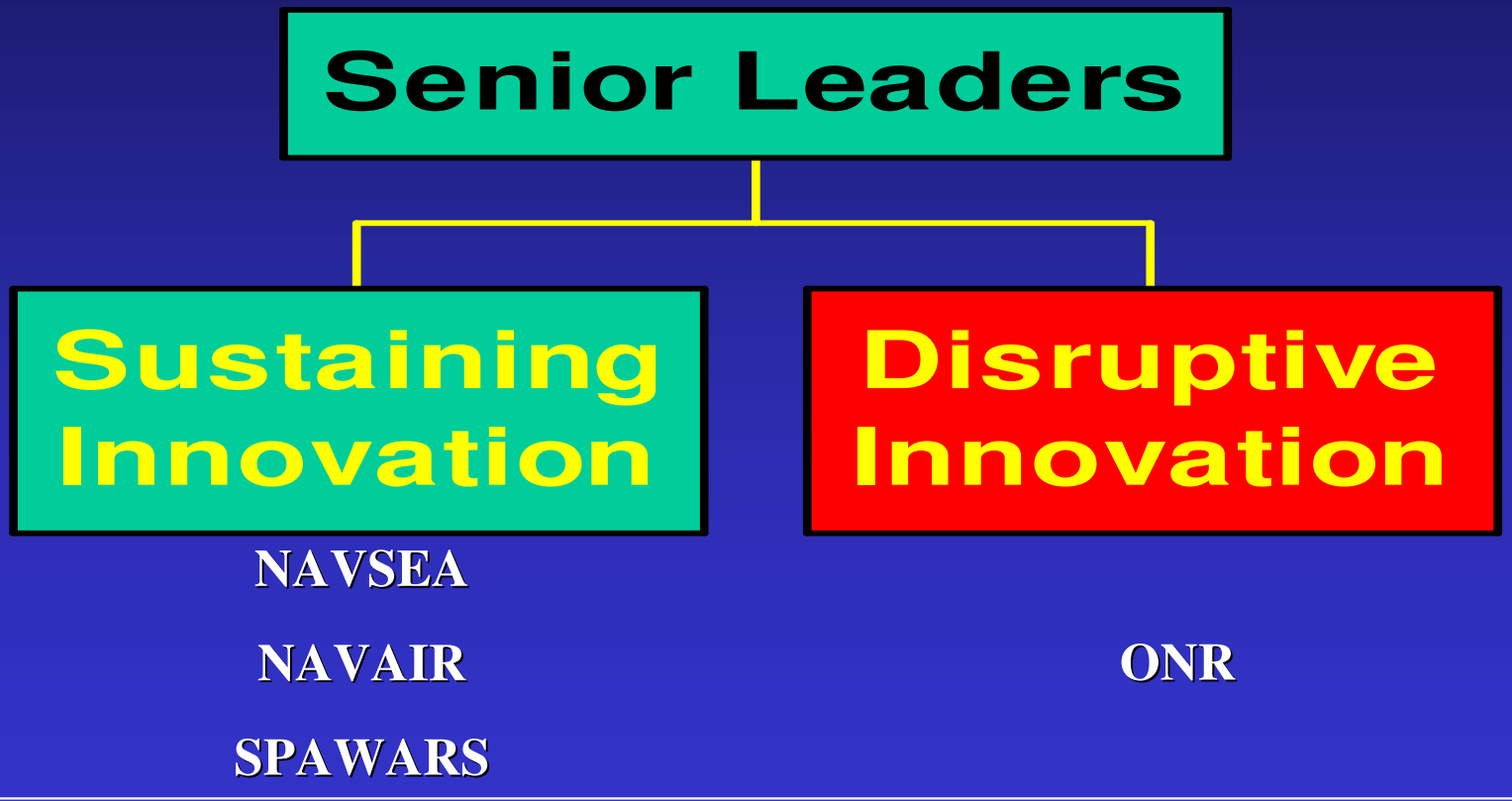
Warfighting Evolution: Periods of Sustaining Change Punctuated by Disruption Innovation



- **Managing Disruptive Change Fundamentally Different from Managing Sustaining Change**
- **The Most Successful Senior Leader/Teams can Manage Both.**

Navy as Ambidextrous Organization:

Where Senior leaders simultaneously manage both sustaining and disruptive innovation for excelling today and tomorrow



Result: Navy creates/manages streams of innovation (sustaining/ disruptive change) over time.

Questions?