



**Create and Deliver Superior Products
Through Innovative Minds**



Advanced Development Programs

**Precision Strike Winter Roundtable
“Long Range Strike Weapons”
Frank Cappuccio, February 1, 2007**



An Industry Perspective



- 1. What LRS Capabilities Does the Customer Community Want?**
- 2. What Are the Desired Attributes of LRS Weapons?**
- 3. How is Industry Responding?**

It All Depends On ... the CAPABILITIES Required & Who's Buying



Long Range Strike Journey



“Here is *Industry Bear*, coming downstairs now, bump, bump, bump, on the back of his head, behind Christopher Robin.

It is, as far as they know, the only way to come downstairs, but sometimes we feel that there really is another way...

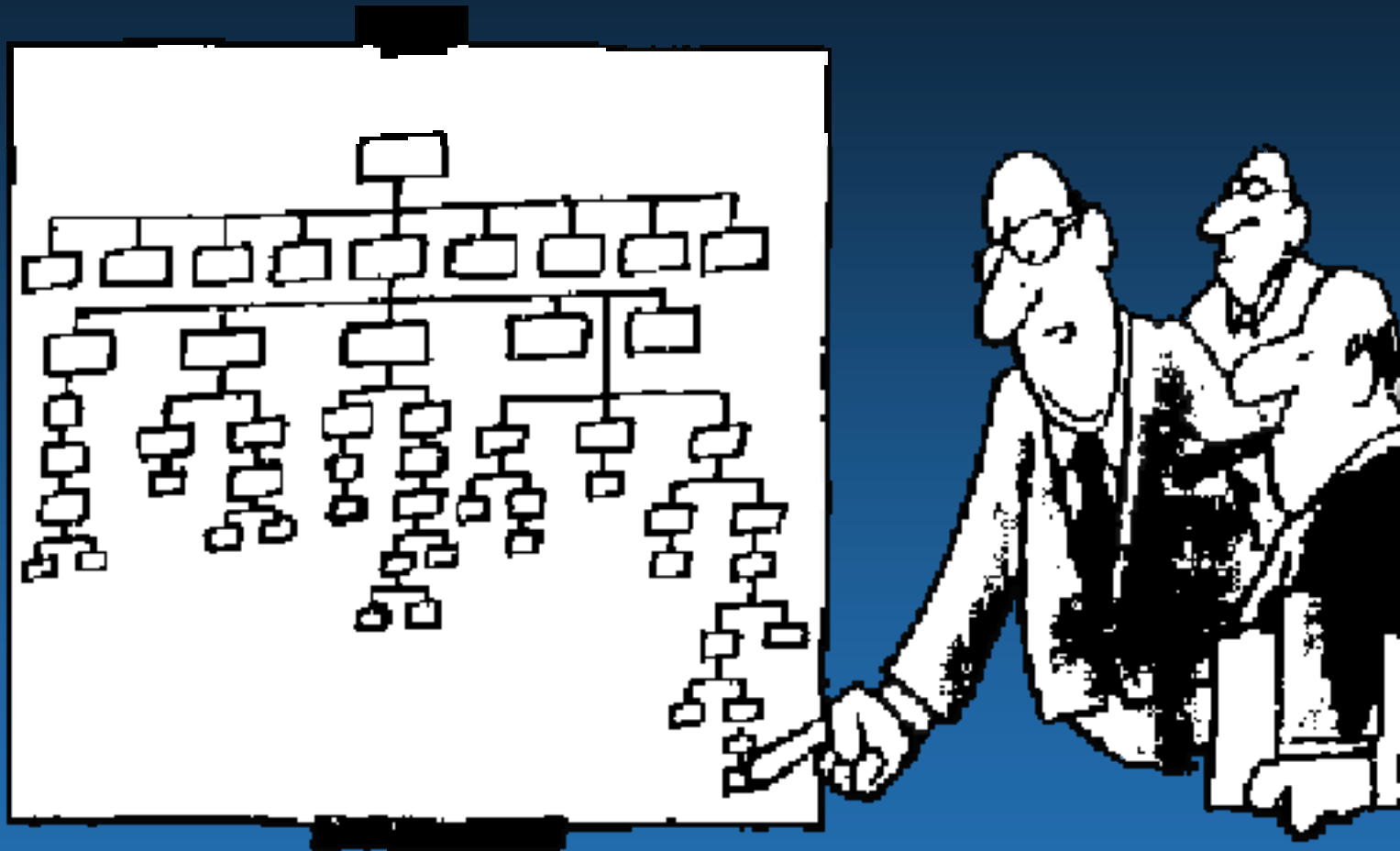
If only we could stop bumping for a moment and think of it!”



Original Source: Augustine's Laws



CEO Opportunity Review Board



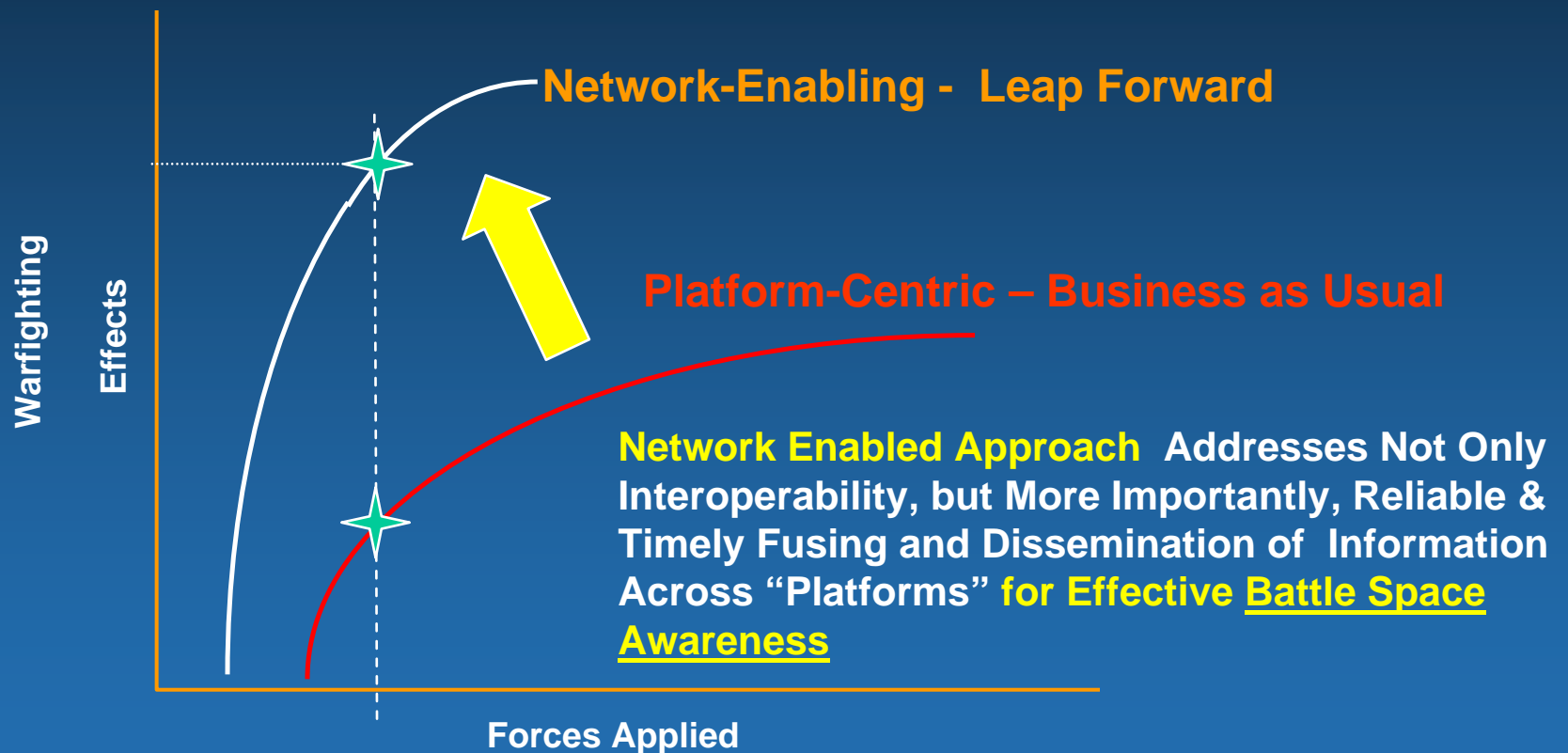
Frank:
“Is this your Requirements Source?”



Framework for the Future



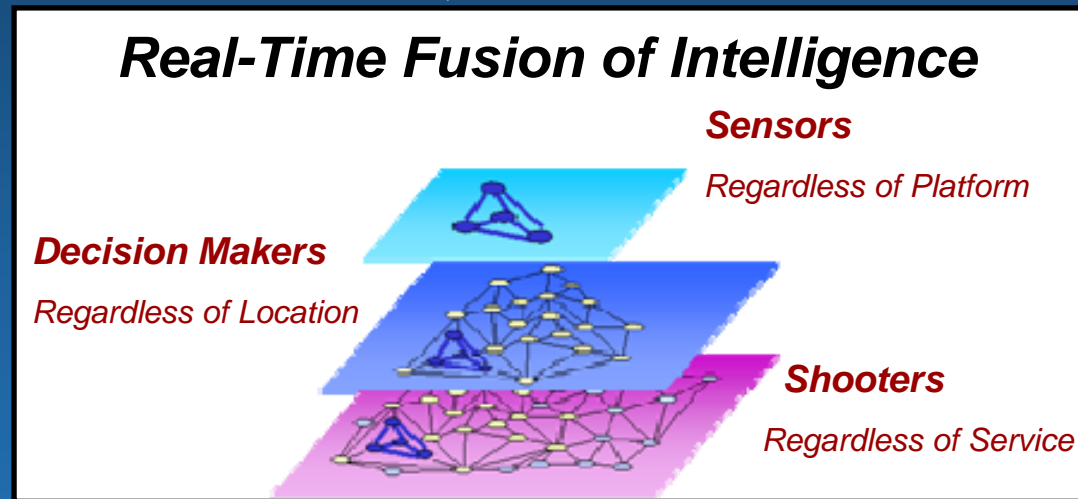
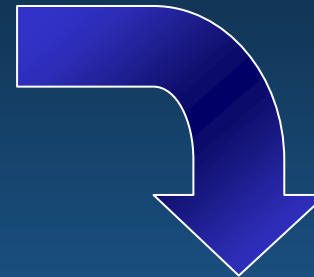
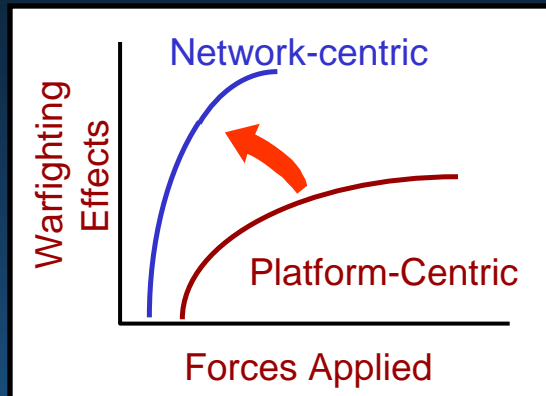
Strategic Vision: Provide the “War-fighter” an Exponentially Increased Capability to Address a Wide Range of Threats, Via Either Preemptive and or Reactive Force, With High Confidence of the Source of the Threat



Information Awareness Critical for Precision Engagement



Framework for the Future



Information Advantage Elements

Battle Space Awareness Critical for Precision Engagement



Future Operational Environment



- **Anti Access Due to Basing Restrictions Must Be Accomplished**
 - *Impacts Navy and USAF CONOPS*
 - *Forces Strikes From Long Distances in Early Days of Campaigns*
- **Proliferation of Next Gen Threat Defensive Systems Must Be Countered**
 - *“Double-digit” SAMs, e.g., S-400, HQ-9, and Follow-ons / Mods*
 - *Advanced Fighters With Advanced IRSTs, Radars, Missiles*
 - *Digital IADS / Networked Radars*
- **Various Levels of Scenarios / Threats Must Be Addressed**
 - *Near Peer, Highly Capable, High Threat, e.g., China*
 - *Difficult / High Threat, e.g., North Korea*
 - *Quick Reaction, e.g., Neutralize WMD Threats, GWOT*
 - *Lower Intensity, e.g., Afghanistan, Bosnia, GWOT, etc*
- **High Value, Time Critical Target (TCT) Set Must Be Prioritized**
 - *Majority Are Fixed, Preplanned*
 - *TBM / SAM Pop Up Targets Included*
 - *Target Rich in Large Scenarios*
 - *“Lone Ranger”*



Future Strategic Strike System Options



Difficulty & Time

Key Requirements/Customers

Technical
Difficulty



LRS (Long Range Strike)	PGS (Prompt Global Strike)
ISC (Interim Strike Capability)	LRS

Near-Mid Term

Mid-Far Term



LRS <ul style="list-style-type: none">• Mach 0.8 – 2+• <3,000 nm• 10 – 40k lb Payload	PGS <ul style="list-style-type: none">• Mach 7 – 25• 5 – 10k nm• 20 – 40k lb Payload
ACC	STRATCOM
ISC <ul style="list-style-type: none">• Mach 0.5 – 2.0• 1,500 – 3000 nm• 5k lb Payload	LRS <ul style="list-style-type: none">• Mach 3 – 7• 3 – 10,000 nm• 10 – 40k lb Payload
ACC	ACC / STRATCOM



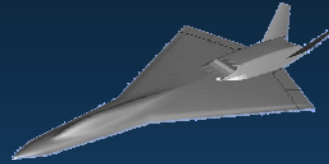
Industry Options For Strategic Strike



**Advanced Hard
Target Penetrating
Weapons**



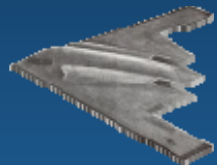
**Super / Hyper
Weapons**



**Mach 2- 4
QSP & LRSA**



Supersonic UCAVs



Traditional



Missileer

Industry Actively Investigating Multiple Categories of Future Strike Systems, Enablers, and Capabilities

- *Examining, Speed, Altitude, Payload, Survivability, Responsiveness*
- *Developing Future C4I Connectivity Solutions*
- *Working with USAF / USN to Identify Requirements*
- *Looking for Cost Effective Solutions*



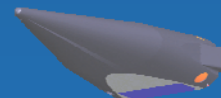
**Military
Space Plane**



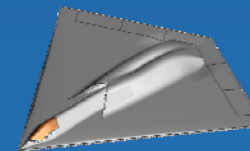
**Small Expendable
Launch Vehicle**



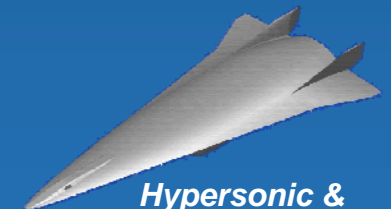
Subsonic UCAVs



**Common Aero
Vehicle (CAV)
Weapons**



**Subsonic
Transonic**



**Hypersonic &
Space Access**



Attributes for Precision Engagement



1. Reach

- *Range, Anti-Access, Multiple Platform Compatibility*

2. Responsiveness / Speed

- *Combination of Reach, Speed, and the Right Payload for the Target, Multi-Vector Approach*

3. Lethality

- *Precision Required, Soft, Hard, HDBT, Collateral Damage*

4. Survivability

- *Altitude, Speed, Special Technology*

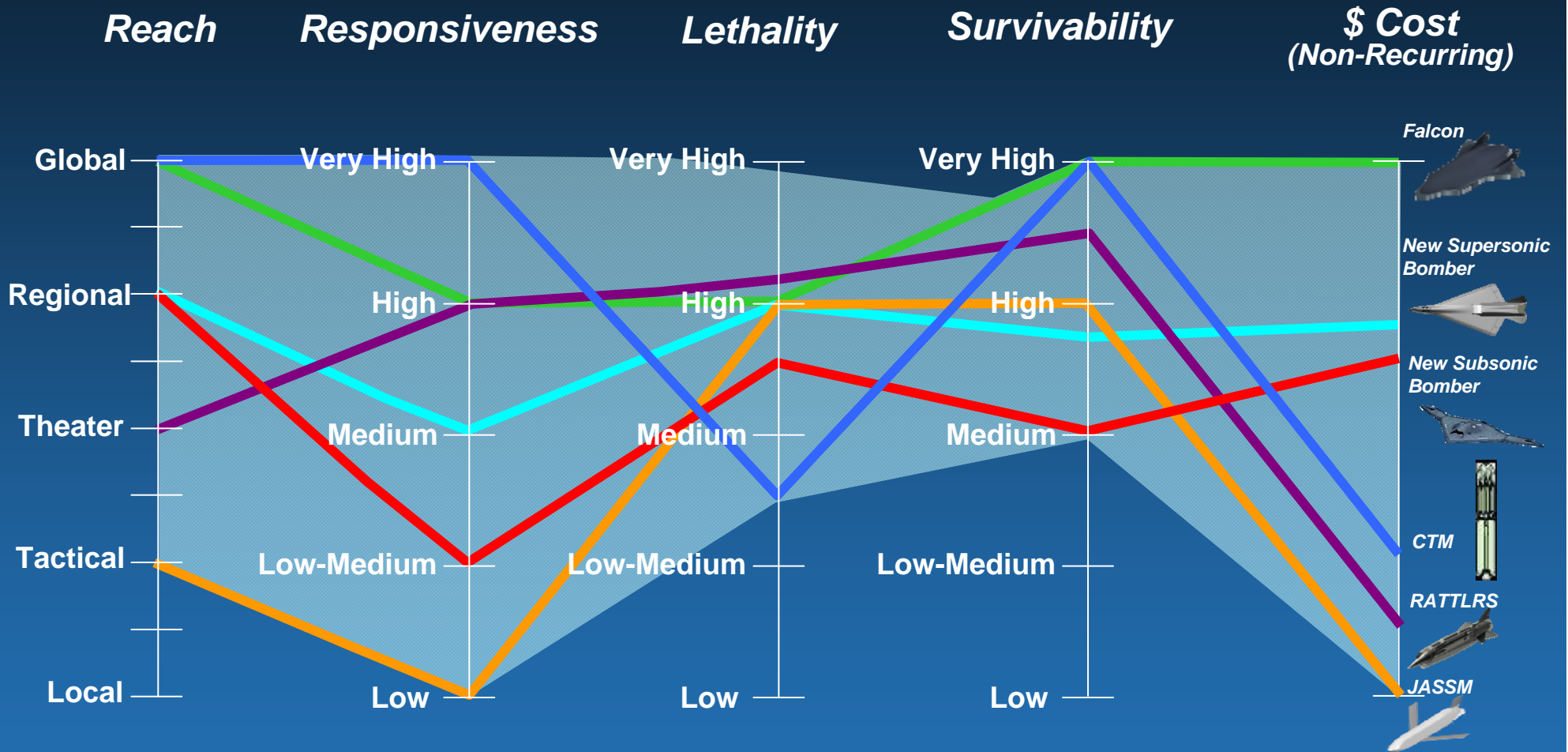
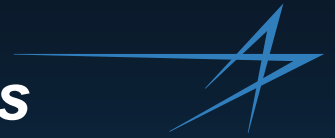
5. Cost

- *Sufficient Production Numbers, Affordable Manufacturing Methods*

It All Depends on ... the CAPABILITIES Required



Precision Engagement Attributes Trades



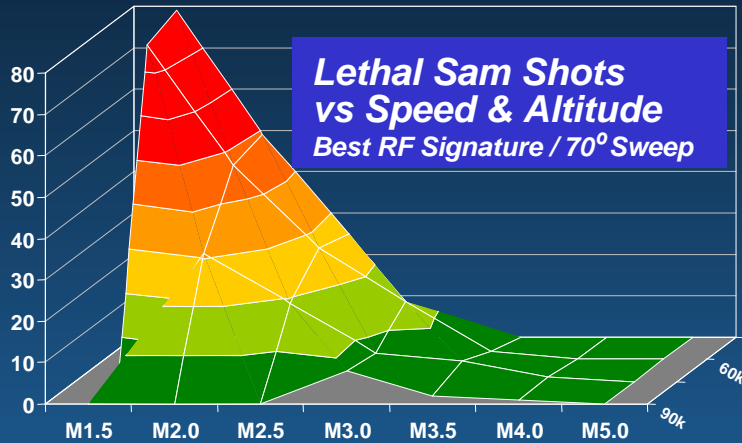
Requirements Drive the Solution



Speed - The Attraction and Risk Remain



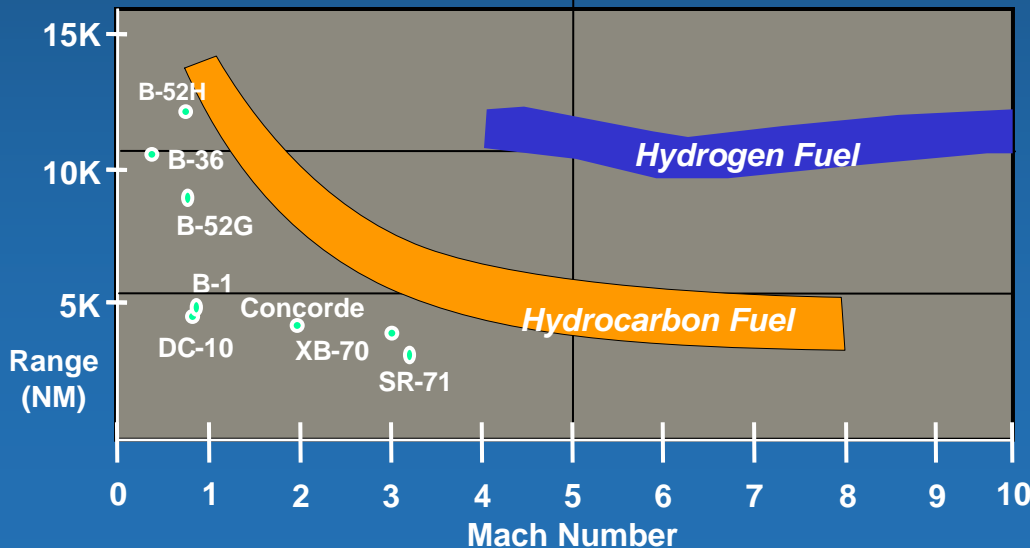
Speed is Life - Survivability



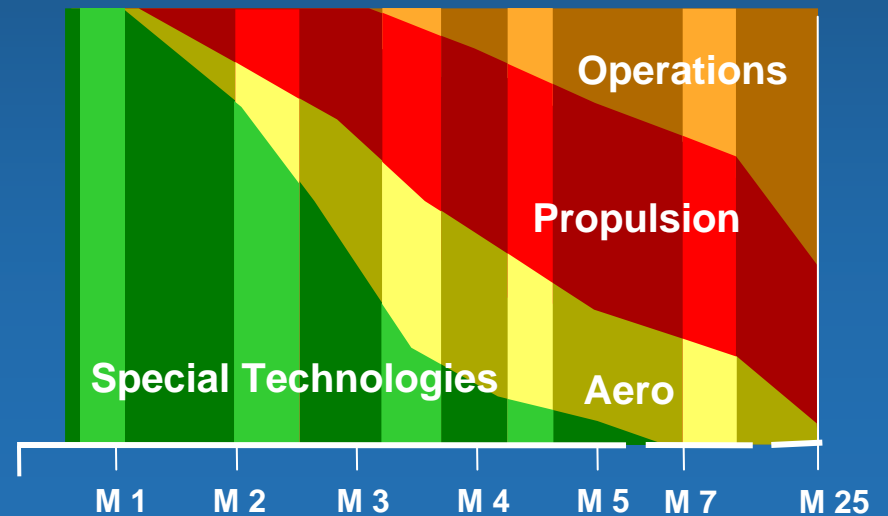
Speed Cuts Timeline to Engage Time Critical Targets

Mach Range	0.8	4.0	6.0	8.0	10.0	12.0
200	26.2	5.2	3.5	2.6	2.1	1.7
400	52.3	10.5	7.0	5.2	4.2	3.5
600	78.5	15.7	10.5	7.8	6.3	5.2
1000	131.0	26.2	17.4	13.1	10.5	8.7

Can Provide Global Range



Technology Focus Changes With Speed





"The Holy Grail"



Let me get this right ... You want to:

- ***Geolocate terrorists or WMD to "1 foot"***
- ***Reach out 2000 nm in "seconds"***
- ***Deliver a lethal payload with "no collateral damage"***
- ***Penetrate 200 ft of "super concrete ... steel preferred"***
- ***... and hold an "icy refreshing beverage"***



Contact Information



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