Systems Innovation for Soldier System Weapon Design

37th Annual Guns & Ammo Symposium
National Defense Industrial Association
April 17, 2002

Brian P. Hall, Business Area Director
General Dynamics Armament Systems

Don Brush, Technical Director
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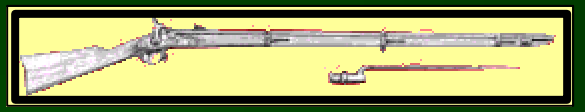
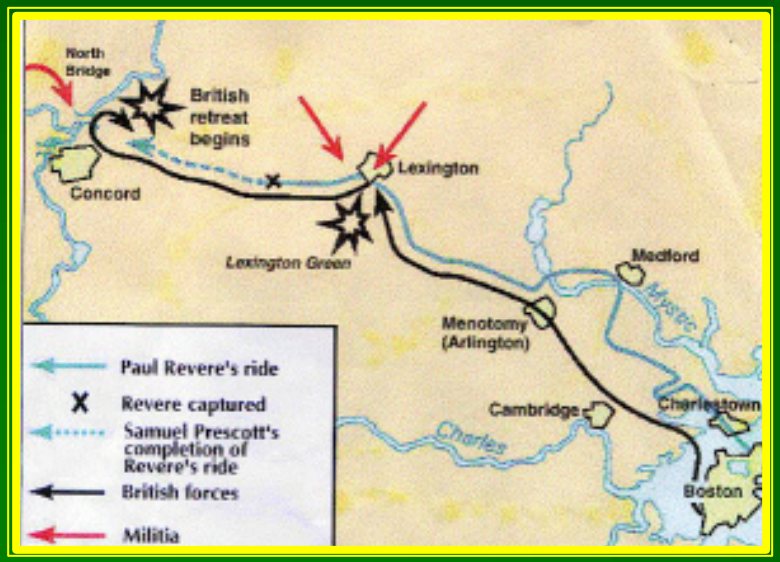


- History repeats itself
  - The most powerful nation in the world
  - The most powerful army in the world
  - A small band of revolutionaries
    - What harm can they cause?



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Then

1775 British Army: *Unpredictable Time & Place For Land Combat*

Now

2002 US Army: *Unpredictable Time & Place For Land Combat*

Implications of Today's Operational Environment

- ***Physical Environment***
  - Prescribes type forces that fight & manner conducted
  - Urban areas growing 3X faster than population:
  - ***Urban warfare virtually assured***

- **Implications:**
  - Limited range, close quarters battle (CQB) predominates
  - Manpower vs. "platform" centric
  - Restricts mounted/dismounted maneuverability
  - Degrades technological and platform based superiority
  - Physical & mental strain

- ***Emergence of "fighters" vs. soldiers***
  - Non-traditional organization
  - Emergence of a "Warrior Class"
  - In fight for the "long haul"

- **Implications:**
  - Unconstrained ROE vs. constrained US ROE
  - High intensity, "crude" combat
  - Brutal, lethal engagements

Areas of Operation

Operations on Urban Terrain
(Dismounted supported by Mounted)

CRITICAL MISSIONS & TASKS:

- Attack/Defend
- Cordon & Search
- Ambush
- Conduct Reconnaissance
- Breach Obstacles
- Assault Building
  - *Enter a Building*
  - *Clear Room*
- Coordinated Operations w/Armor
- Fire From Enclosures
  - *Destroy Armor*
  - *Create Entry Points*
  - *Defeat Bunkers/Strong Points*
- C^2 Operations
  - *Digital Voice & Data*
  - *Through Buildings & Subterranean*
- Employ Snipers

PROBLEM

CURRENT SOLDIER TOOLS DEVELOPMENT PROCESS

REQUIREMENTS

- M4MWS
- JAVELIN
- TWS
- AN/PVS7/14
- AN/PEQ4C
- INTERCEPTOR
- MOLLE
- AN/PRC126

CHALLENGES:

INTEGRATION AND ANALYSIS OF REQUIREMENTS TO MAXIMIZE SOLDIER CAPABILITY

BALANCING PERFORMANCE
POWER
WEIGHT
VOLUME
INTEGRATION
COST
TRAINING

SOLUTION

REQUIRED INTEGRATED PROCESS

REQUIREMENTS + METRIC

- M4MWS
- M16
- TWS
- AN/PVS7/14
- AN/PEQ4C
- INTERCEPTOR
- MOLLE
- AN/PRC126

R&D

S&T

FUTURE METRIC

SSDT / ICT

ASSESSMENT AND INTEGRATION

INTEGRATED SYSTEMS

April 17, 2002

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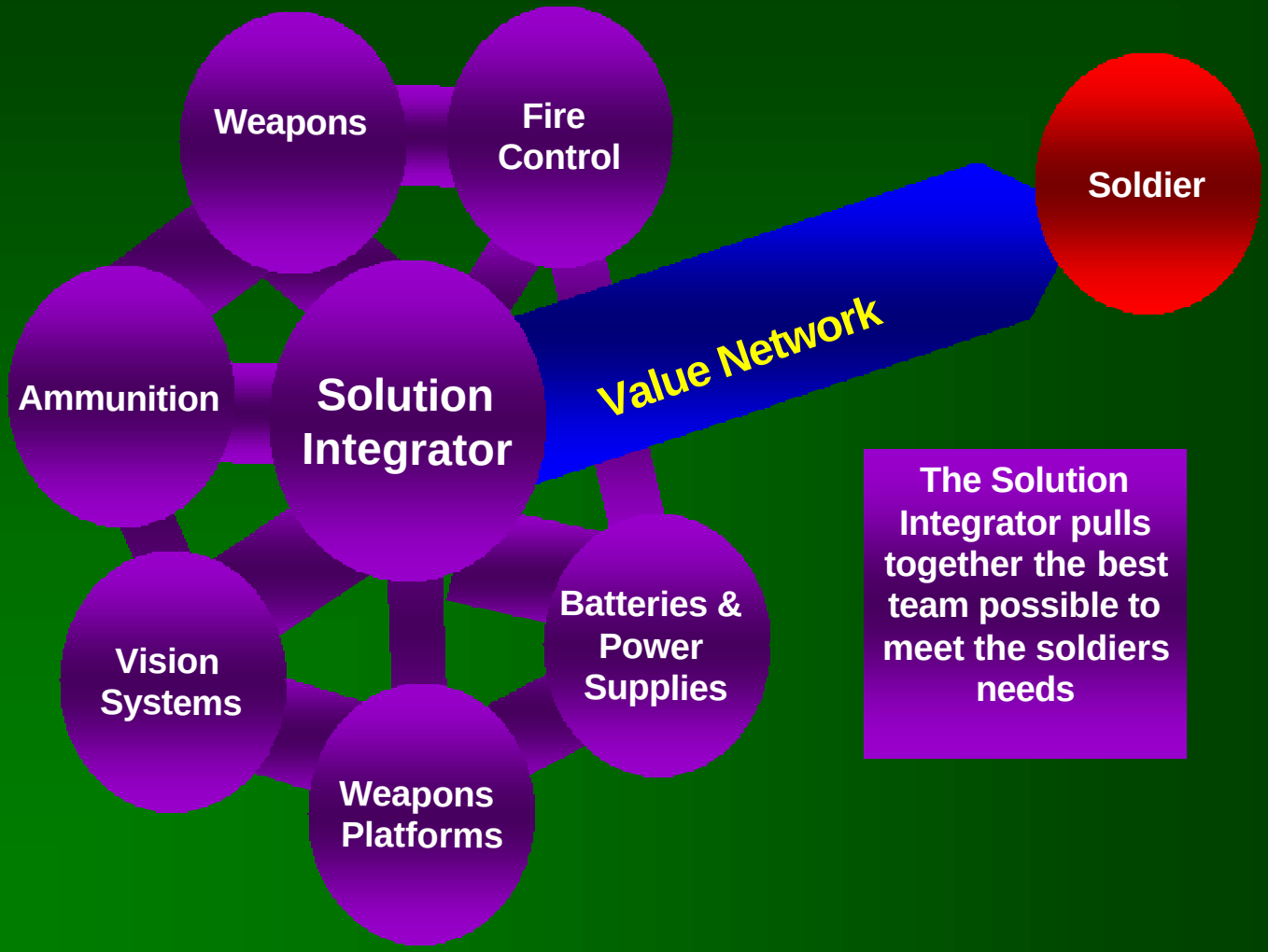
Question:

How to create soldier systems integration?

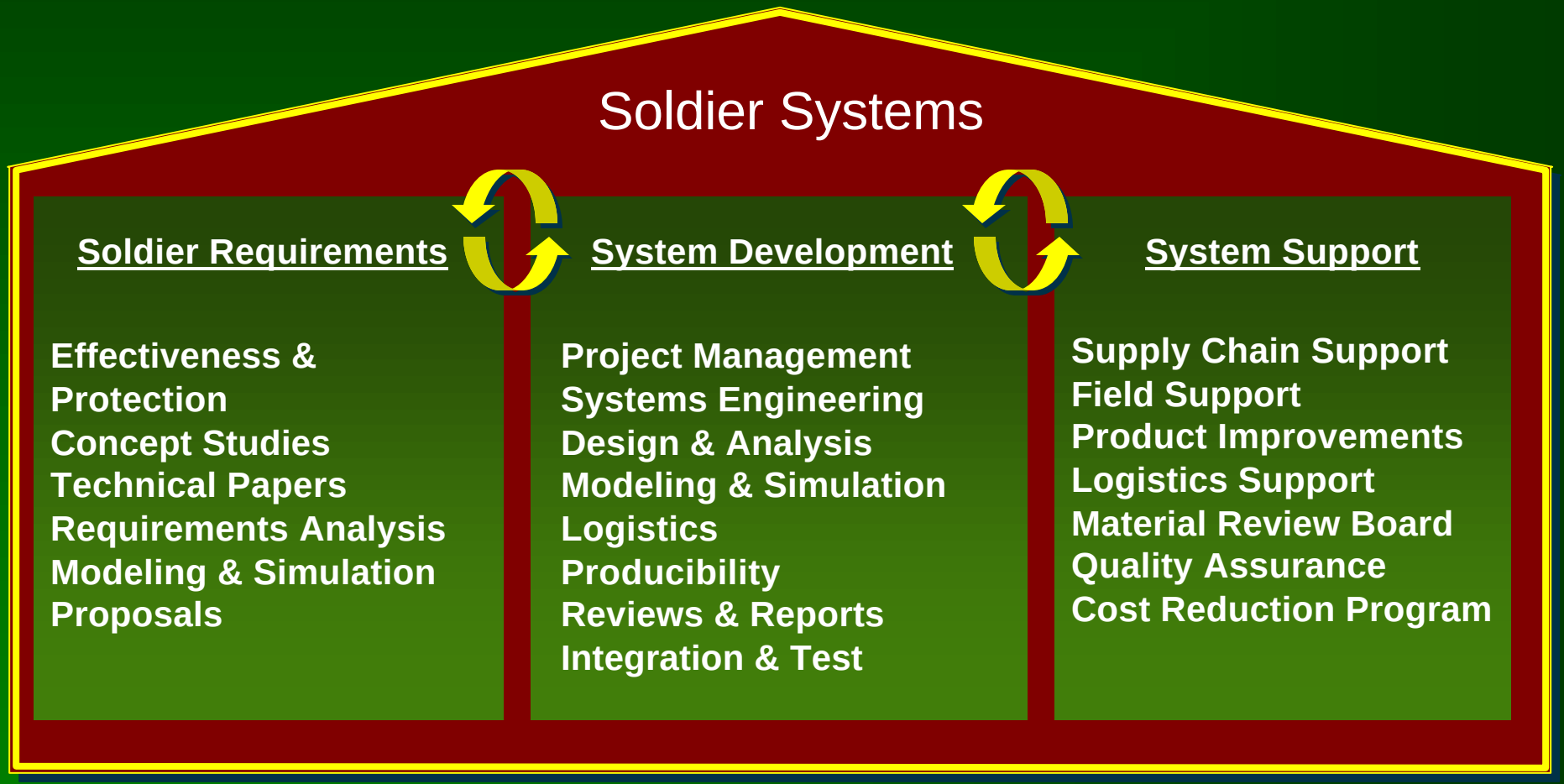
Solutions Integrator



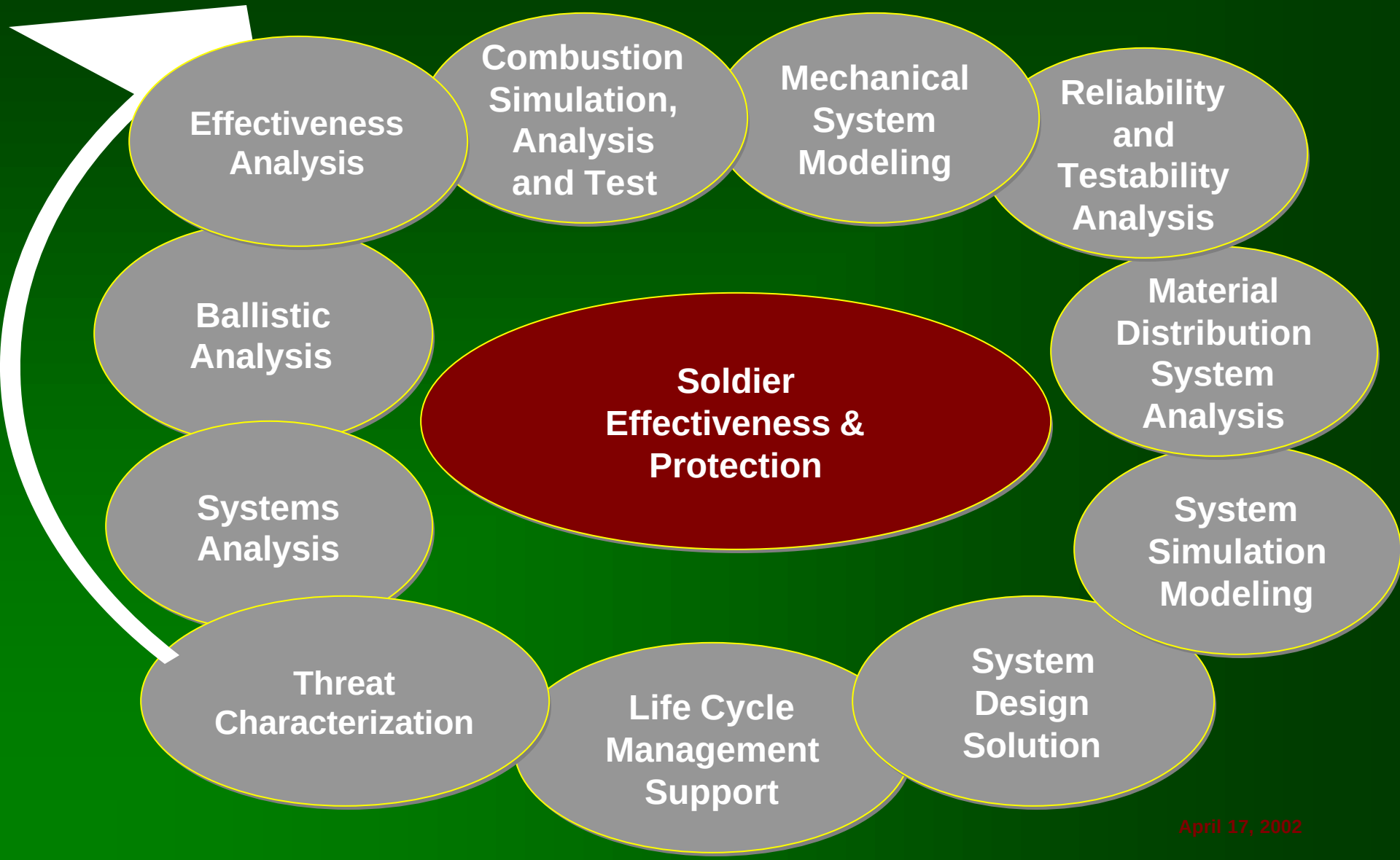
The Solution Integrator pulls together the best team possible to meet the soldiers needs

Role of Solution Integrator

Pull the best possible talent together to provide:



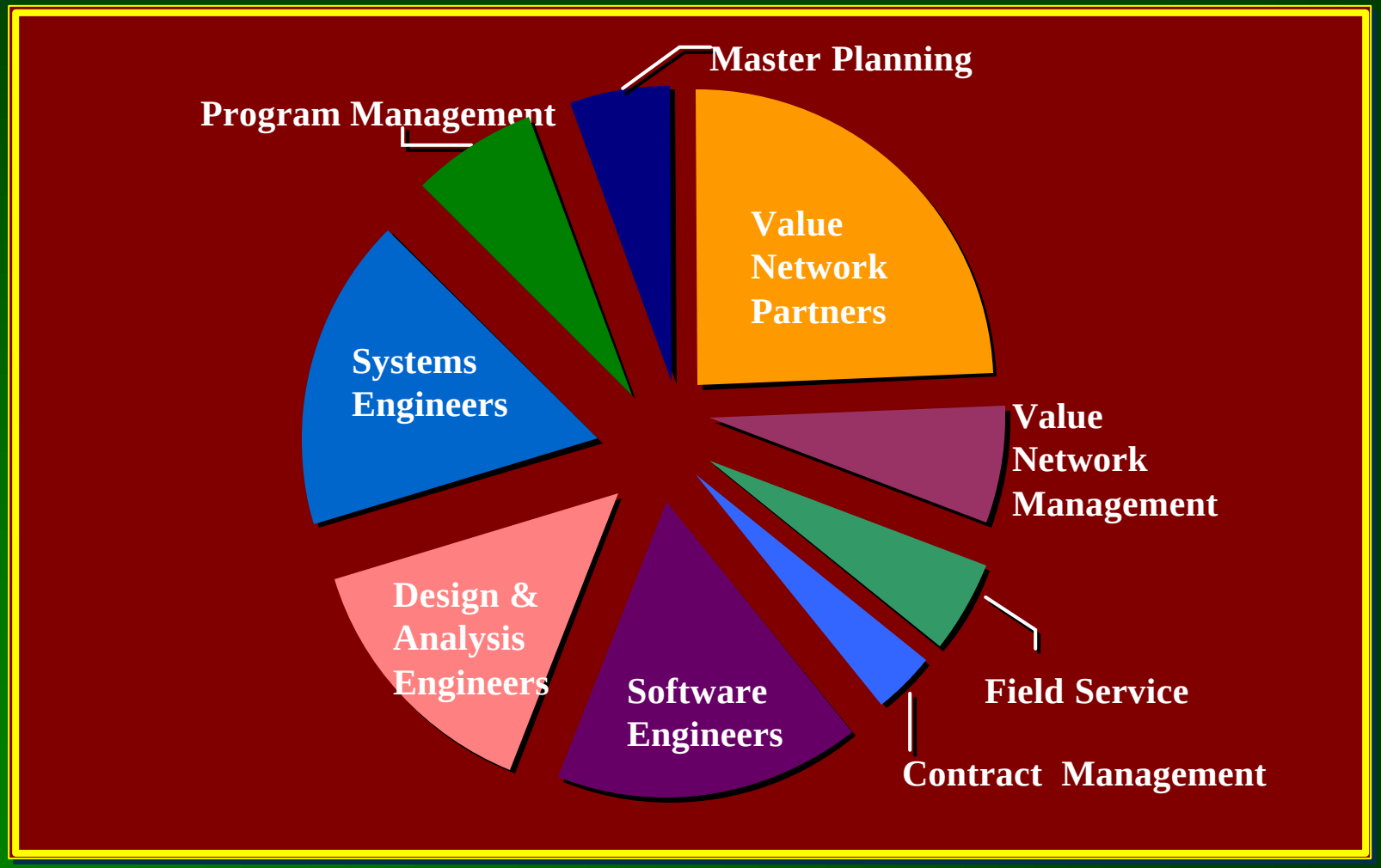
System Modeling, Simulation & Analysis Requirements



Armament System's approach to meeting the need for soldier system integration

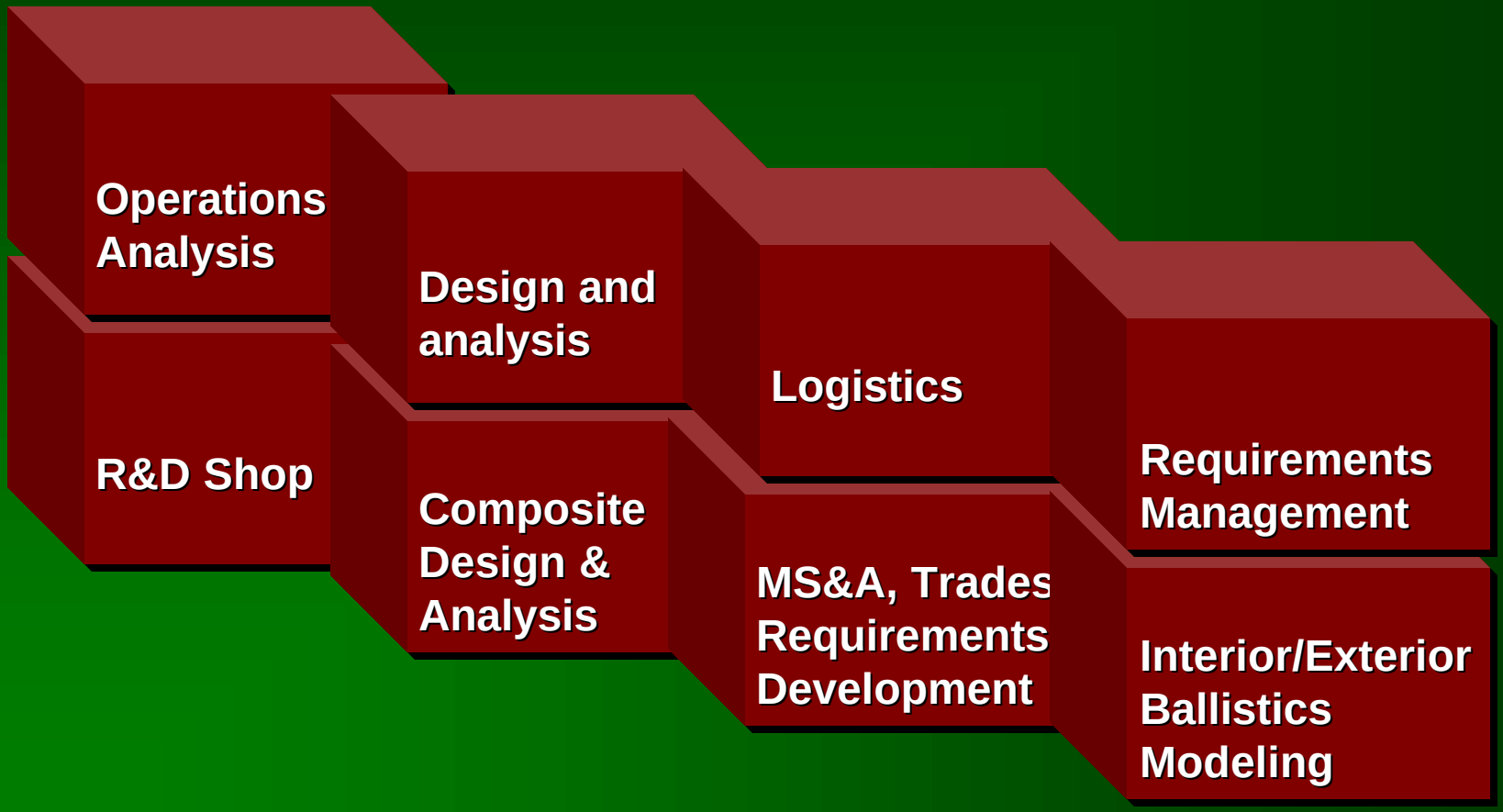
Armament Systems – Systems Integrator

Build a Strong Integration Management Team



Armament Systems - Systems Integrator

Build a Solid Design, Production and Support Value Network



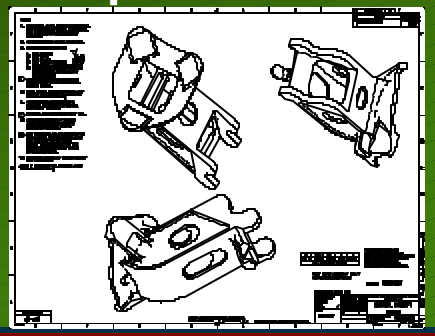
Armament Systems - Systems Integrator

Integrate the right tools across the Value Network

Mechanical System Modeling

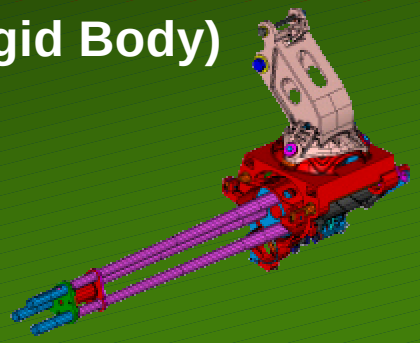
Solid Model Generation

- Mass Properties of Assemblies and Components
- Space Claim, Interference Checking
- Used for future simulation efforts
- Detail Drawings



Mechanism Design and Simulation (Rigid Body)

- Kinematic
- Dynamic



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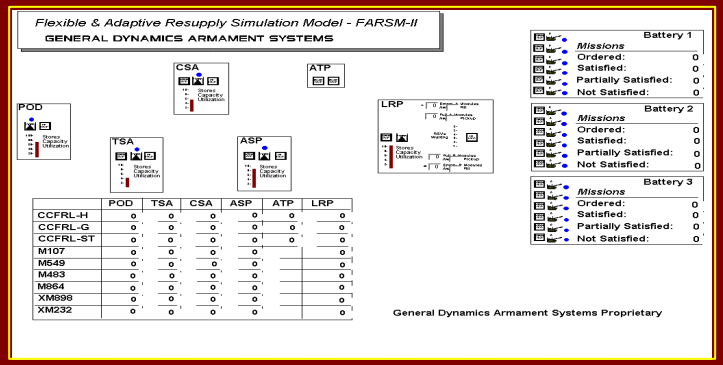
Discrete Event Simulation Modeling

Essential Analysis Tool
- Requirements development, design trades, concept exploration
- Operational planning, operational improvement

Variable Model Scope
- Detailed micro analysis of single unit to entire theater
- Track materials from ammunition to all battlefield consumables

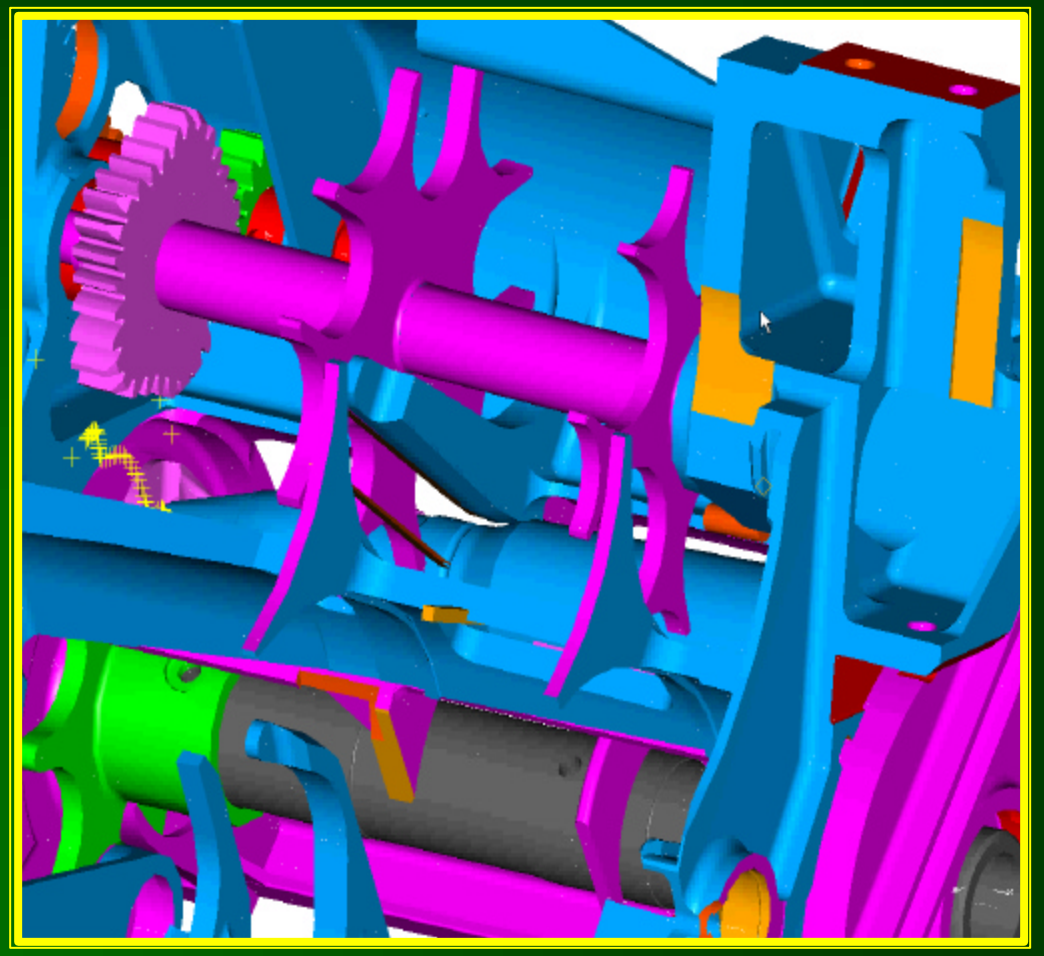
Variable Tactics
- Network control & resource management
- Supply & demand coordination

Advanced Analytical Techniques
- Statistically correlated sensitivity
- Multi-variable optimization



Armament Systems - Systems Integrator

Integrate design tools across the Value Network



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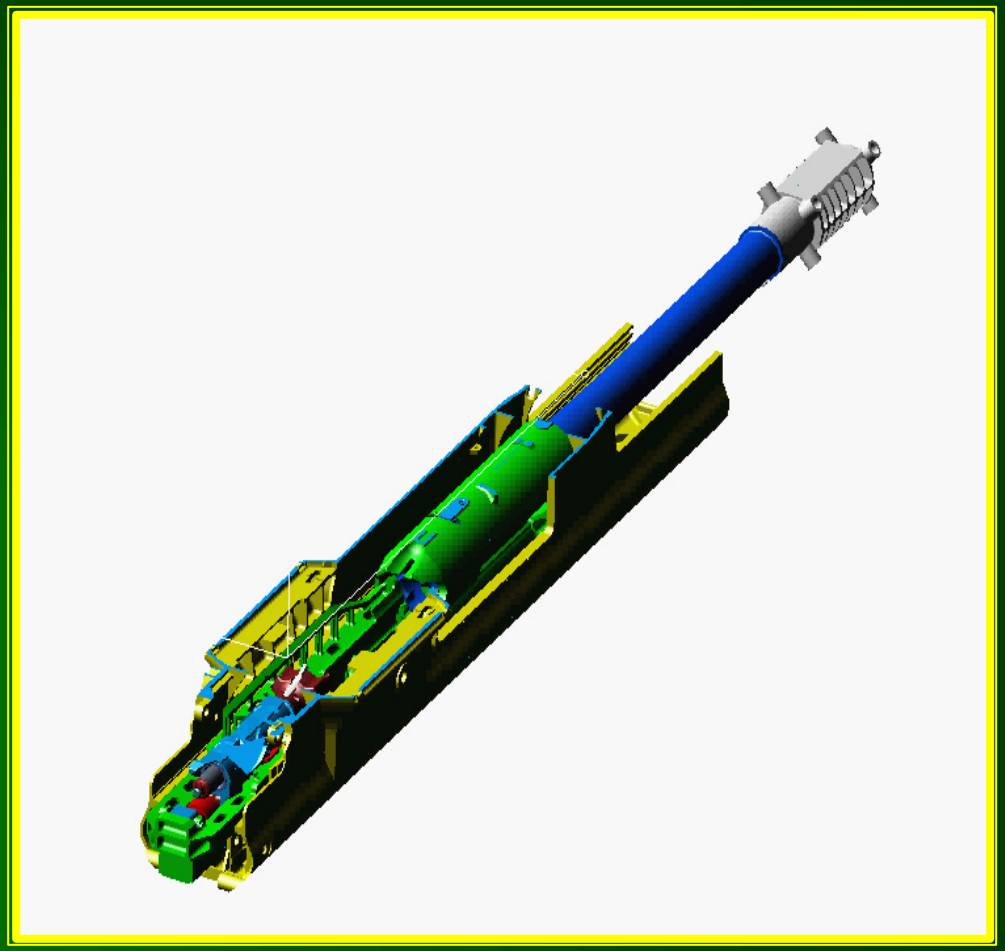
Utilize the tools to produce and analyze the optimum solution



Armament Systems - Systems Integrator

Deliver the Solution the Soldier Needs . . .

Then Make it Better!

MK47
AS
Crane
NAMMO
GD Canada Ltd.

XM-307 (OCSW)
AS
JSSAP, FCS LSI
GD-OTS
Raytheon

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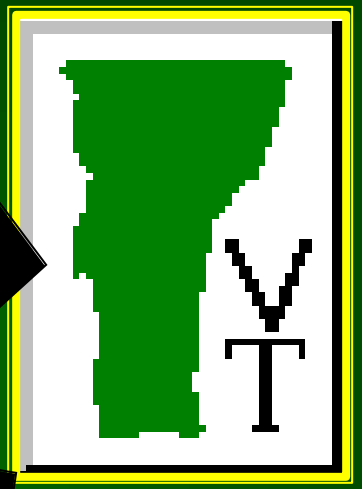
Now back to where we started:

Then…

Now…



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