Future Small Arms Technology Plan Development

The Fusion of Science and Science Fiction

Joel M. Goldman

Chief, JSSAP Office
JSSAP’s Future Small Arms Technology Plan
The Fusion of Science and Science Fiction

Briefing Outline

Purpose
Futures I: The Science Fiction Writers
Futures II: The Scientists, Engineers and Military
Follow-on Activities: Plan Development
JSSAP’s Future Small Arms Technology Plan
The Fusion of Science and Science Fiction

Purpose

Develop the Foundations
of a
Mid-Far Term Technology Investment Strategy
for
The Joint Service Small Arms Program
Who: Principally Science Fiction Writers

When: 11-12 March 2008

What: Broad-based Concepts Identified and Assessed
- Positives
- Negatives
- Enhancements
- Potential

The Generation of Concepts That Will Lead to Creation of a Warfighter Capable of Overwhelmingly Defeating the Enemy Combatant of the Future
Futures I
The Science Fiction Concepts

The Science Fiction Writers

Charles Gannon
S. M. Stirling
Will McCarthy
Kathleen Goonan
Jeffery Carver
Arlan Andrews
Matt Armstrong
John Hemry
Michael Swanwick
The Generation of Concepts That Will Lead to Creation of a Warfighter Capable of Overwhelmingly Defeating the Enemy Combatant of the Future
Sampling of Concepts

Robotic Dog ("Snoopy")
Persian Donkey
G-D-H (Girlfriend – Dog – Hawk)
Understand Motivation of Enemy
Smart Dog Tag
Psychic Potential
Personal Strap-on Jets

Odors  Sheddable Exoskeleton
Artificial Muscles  Brain Plasticity  Zero Point Energy  Antimatter
Prosthetics as Fighting Aids  Panic Generator  Explosive Suppressor
Kamikaze UAV Bombers  Climate Change  Nutraceuticals
Stealth via No Emissions  Holographic Deception  “Mouse”/Camera
Affinity Groupings

Intelligence Gathering – 10 Concepts

Human Factors – 18 Concepts

Increased Firepower – 18 Concepts

Increased Survivability – 5 Concepts

Increased Battlefield Impact – 23 Concepts
Futures I 
Example Concepts

Intelligence Gathering
Understand motivation of enemy
MOUT/counter-insurgent operations where an enemy is not in uniform.
Pros: Interpret actions as being friendly/hostile.
Predictability, Diffuse confrontations, Empowering the warfighter
Cons: Requires training, Leaves the decision in warfighters hands

Increased Survivability
Odors
Demographic/friendly force specific products
Pros: Differentiates, allows IFF
Cons: One aspect of info (not 100% reliable)
May be easy to spoof if the predominate odors are due to cosmetics or laundry.

Human Factors
Artificial muscles
For large muscle control and fine muscle control.
May enable microsurgery on the battlefield
Pros: Provides superhuman strength, reduces fatigue
Cons: Unintended consequences

Increased Battlefield Impact
Nanoparticle dust information gathering
Projectile-based dispersal of small “dust sized” information gathering particles.
Pros: Remote, versatile
Lower interception/jamming potential
Cons: Environmental issues (wind, fans, etc)

Enhanced Firepower
Zero Point Energy
Tapping energy from the quantum vacuum.
Nanotech batteries may use this technology.
Pros: Inexpensive, freely available energy
Cons: No technology to harvest or utilize
Futures II
The Scientists, Engineers and Military

Who: SME’s from Military, Industry, Academia, Government and National Labs
When: 30 April-1 May 2008
What: Technologies Mapped to Concepts and Assessed
Concepts Assessed wrt Empowerment of Small Arms Platforms
- Lethality/Incapacitation
- Network Integration
- Overall Integration

Identify the Concepts That Can Empower the Warfighter’s Small Arms Platform
Futures II
The Scientists, Engineers and Military

Process

**Affinity Groupings**
- Intelligence Gathering
- Human Factors
- Enhanced Firepower
- Increased Battlefield Impact

4 Groups
- Generate Additional Concepts;
- Link Technologies

4 Groups
- Assessment Mid to Long Term Rationale

4 Groups
- Assessment Network Incapacitation
- Overall Integration

4 Groups
- Assess Linkage to Small Arms Platforms

Prepare Report & Develop Plan
### Augment the Warfighter Mobility Via Sheddable Exoskeleton

<table>
<thead>
<tr>
<th>Concept</th>
<th>Technology</th>
<th>Short Term Feasibility</th>
<th>Long Term Feasibility</th>
<th>Assessment with Support Rationale</th>
</tr>
</thead>
</table>
| Augment the warfighter mobility by a sheddable exoskeleton | Biomechanics | H | H | • Greater Load – Short Term/ Medium  
• Greater warfighter agility – Long Term/Low  
  • Lack of acceptance from user  
  • Biomechanical limitations of body  
• Scalable complexity |

Feasibility Ranking Legend: U = Undetermined, L = Low feasibility, M = Medium feasibility, H = High feasibility  
Assessment to include challenges to implementation and concept/technology maturity
# Human Factors Example Output

## Part II

### Augment the Warfighter Mobility Via Sheddable Exoskeleton

<table>
<thead>
<tr>
<th>Concept or Technology</th>
<th>Platform</th>
<th>Application or Linkage to Small Arms</th>
<th>Network Centric Integration</th>
<th>Improved Lethality or Incapacitation</th>
<th>Integration of Network Centric &amp; Lethality or Incapacitation</th>
<th>Assessment with Support Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biomechanics</td>
<td>All platforms</td>
<td>Y</td>
<td>N/A</td>
<td>Y</td>
<td>N/A</td>
<td>• Leverage shock mitigation work in shipping sensitive materials</td>
</tr>
<tr>
<td>Actuators/power</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Weight and power concerns</td>
</tr>
<tr>
<td>DARPA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Maturity Level</td>
</tr>
<tr>
<td>SARCOS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Short Term – Medium (load carriage)</td>
</tr>
<tr>
<td>ONR</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Long Term – High (agility)</td>
</tr>
<tr>
<td>Lightweight materials</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Recommendation - Continue funding</td>
</tr>
<tr>
<td>Sensor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Customized applications</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Watch link to prosthetics</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Partial exoskeleton</td>
</tr>
</tbody>
</table>

**Application/Linkage Ranking Legend:** Y = Yes, N = No  
**Network Centric Integration Ranking Legend:** U = Undetermined Risk, L = Low Risk, M = Medium Risk, H = High Risk  
**Improved Lethality/Incapacitation Legend:** U = Undetermined, Y = Yes, N = No  
**Integration of Network Centric & Lethality/Incapacitation Legend:** U = Undetermined Risk, L = Low Risk, M = Medium Risk, H = High Risk
What’s Next?

Complete the Future Tech Assessment Report
Brief at National Small Arms Center Meeting
Solicit White Papers Submissions
Develop the Technology Plan

Forge a Technology Investment Strategy That Will Lead to Small Arms Systems Capable of Overwhelmingly Defeating the Any Enemy Combatant of the Future