



# HORIZONTAL FUSION

CATALYST FOR NET-CENTRIC TRANSFORMATION • DEPARTMENT OF DEFENSE

## **What is Transformational about Horizontal Fusion? White Paper**

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**ASD/CIO Horizontal Fusion  
Portfolio Initiative**

**Portfolio Manager: Marian Cherry**

**8 August 2003**

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**White Paper**  
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Secretary of Defense Donald Rumsfeld has provided a clear vision for DoD Transformation:

**“The two truly transforming things might be in information technology and information operation and networking...connecting things in ways that they function totally differently than they had previously.**

**And if that’s possible...then possibly the single-most transforming thing in our force will not be a weapon system, but a set of interconnections and a substantially enhanced capability because of that awareness.**

**It can simply be in connectivity. It can be in interoperability. It can be in taking things that every single of which exists presently and managing them, using them, connecting them, arraying them in a way that has a result that is transformation.”**

Source: Address by Secretary Rumsfeld, 9 August 2001 Town Hall, Washington DC

These concepts – once thought abstract and remote – are today being operationalized in the actual combat theater. In fact, in a CNN interview on 25 March 2003, the US Central Command Director of Operations, Maj. Gen. Victor Renuart, cited use of these new information capabilities in the Iraqi theater, resulting in: rapid and synergistic action by the Services and intelligence operations, precision targeting that allows for significant increases in protection of civilians (due to improved decision support and ability to minimize collateral damage), integrated operations that allow humanitarian non-governmental organizations (NGOs) to “lean forward,” even while U.S. troops are “fracturing the regime.”

In fact, to achieve this level of military accomplishment, Secretary Rumsfeld’s vision of Force Transformation depends upon the creation of a Net-Centric integration of intelligence, military operations, and information technology.

As DoD CIO John Stenbit recently said,

**“True transformation can only be achieved by transforming the way we communicate, by making the network work for us, and by taking full advantage of Information Age technologies to ensure that our Warfighters have immediate and direct access to the information they need.”**

“Moving Power to the Edge,” by John P. Stenbit, CHIPS Magazine, Summer 2003 published by the Space and Naval Warfare Systems Center, Charleston.

Building on Mr. Stenbit's concepts, Marian Cherry, Horizontal Fusion Portfolio Manager, emphasizes that Net-Centric Transformation relies on these inter-related efforts:

- The Bandwidth Expansion program, or GIG BE, which provides a secure, robust, optical IP terrestrial network.
- Joint Tactical Radio System (JTRS), which offers a family of software reprogrammable radios based on an open-communication architecture that will provide interoperable tactical wideband IP communications capabilities.
- Wide-band SATCOM, providing ubiquitous communications with optical quality bandwidth to mobile and tactical users.
- Net-Centric Enterprise Services (NCES), which supplies the infrastructure services to support the broad range of applications and data used in a Net-Centric enterprise.
- Information Assurance, vital to support all efforts to ensure that the Net is robust, reliable, and trusted.
- Horizontal Fusion, which provides Net-Centric applications and content needed to assure analysts and Warfighters with the ability to make sense of complex and ambiguous situations across the battlespace.

Source: Introductory Horizontal Fusion CD with Marian Cherry, Horizontal Fusion Portfolio Manager, based on guidance from DoD CIO John Stenbit in the article, "Moving Power to the Edge," CHIPS Magazine, Summer 2003 (published by the Space and Naval Warfare Systems Center, Charleston).

## **Horizontal Fusion**

DoD's Chief Information Officer John Stenbit and Enterprise Architect John Osterholz rose to the challenge of Transformation by creating the Horizontal Fusion Portfolio Initiative. Horizontal Fusion is a direct response to operationalize, integrate, and optimize technology and operations to achieve "Power to the Edge" in the new battlespace.

Osterholz describes this new opportunity:

"The difference between previous attempts at interoperability and now is that – with emergent technologies – global reach and rapid movement of critical battlespace knowledge mean that true interoperability is actually possible."

Source: "DoD Expects Industry To Help It Achieve Net-Centricity," Government Computer News, Richard W. Walker, GCN Staff Writer, 23 September 2002, (interview with John Osterholz - [http://www.gcn.com/21\\_29/management/20098-1.html](http://www.gcn.com/21_29/management/20098-1.html))

Horizontal Fusion is made possible by the new technology context that includes Wideband SATCOM and the Global Information Grid Bandwidth Expansion (GIG-BE). Implications of these capabilities provide leaps in potential for battlefield operations, access to real-time

critical knowledge and situational awareness, informed command decision-making, and operational and tactical response.

### **Horizontal Fusion as a Transformational Net-Centric Initiative**

The Horizontal Fusion Portfolio Initiative was launched by DoD's Office of ASD/C3I/CIO to accelerate the transition of Net-Centric War fighting from vision to reality. Leadership for the Initiative realized from the outset that certain characteristics would be essential to success:

- The Initiative is an integrated experimental effort focused on Net-Centricity.
- The Horizontal Fusion Portfolio includes individual Initiatives capable of forging an interoperable, Net-Centric demonstration..
- The Portfolio Initiative emphasizes full Intelligence, Surveillance, and Reconnaissance (ISR) capability -- use of intelligence to provide indications and warning, human intelligence to discern intentions, and situational awareness and response to surveillance and reconnaissance of the battle-space.
- The Portfolio Initiative utilizes a "Portfolio Integration" approach intended to provide investments for the Department that assure cost effectiveness and efficiencies.
- The Portfolio Initiative supports close to real-time system integration.  
Source: Internal HF Management documents (MC/TM)

Moving beyond former concepts of "plug and play" wiring diagrams, or "one to one" interfaces, or "push" technology, Horizontal Fusion is built on a foundation of transforming the ways in which knowledge is available in the battlespace.

According to Dr. Margaret Myers, Principal Director, Office of the DoD Deputy CIO,

"Horizontal Fusion (will) allow smart pull and data fusion – the sense-making of data by users....We will also need to understand and foster Net-Centric processes, many of which will differ significantly from the way we do things today.

Source: "Power to the Edge," a presentation by Dr. Margaret Myers, Principal Director, Deputy Chief Information Office, DoD

Exploration of Net-Centric capabilities and the processes necessary to provide them is the substance of the work of the Horizontal Fusion Portfolio.

### **What Is/Is Not Net-Centricity**

Net-Centric processes are emerging, being discovered, and are in active development by industry, universities, and the Services. As the Net-Centric technology becomes more reliable and trusted, the DoD culture will adapt more intensive use of its expanded capabilities. The

following table contrasts characteristics of this new Net-Centric environment with the more traditional point-to-point technology approaches.

<b>Net-Centricity Means</b>	<b>Net-Centricity Doesn't Mean</b>
Robust networks without a central weakness	Centralized chain that can be cut or broken
Interoperable communications infrastructure	Multiple "stovepipe" Comms infrastructure
More information, gathered in smarter ways	Totally unrestricted information
Task, Post, Process, Use (TPPU)	Task, Process, Exploit, Disseminate (TPED)
Dynamic – or situational - security	Fixed – domain-specific - security
Only handle information once (OHIO)	Duplicate entries
Real-time collaboration	Best-time-possible Hierarchical Command
Pull assured information down	Push information out
Secure Bandwidth as needed	Bandwidth constrained
Cycle-time in seconds	Cycle-time in hours
Risk management	Risk avoidance
Packets	Circuits

Source: "Net-Centric Warfare Operations Reference Model for the Joint Warfighter: A Concept for the Enterprise View," Version 25, October 2002.

Net-Centricity will create the underpinning to leverage information-based advantage in the battlespace through such technologies as:

- Handheld wireless PC's that can be available everywhere.
- "Pull" systems powered by dynamic search technologies that allow for situational awareness in myriad environments.
- New technologies such as unmanned vehicles, robotics, etc., that provide unprecedented global reach.

These technologies make possible a new level of battlespace insight and knowledge, including:

- Consistently ubiquitous view of the battlefield
- Ready access to Communities of Interest – both federated and integrated - that can operate concurrently and in real-time with rapid knowledge availability.

### **Transformational Goals and Outcomes for Horizontal Fusion**

From the outset of launching the Horizontal Fusion Portfolio Initiative, emphasis was placed on outcome-based performance and results. Portfolio Initiative goals are closely aligned with the DoD vision of Transformation to Net-Centricity with an aim to build practical solutions.

The chart below defines those goals and expected Transformational outcomes to be developed over the course of the next few years through the Portfolio Initiative.

<b>Net-Centric Goals</b>	<b>Expected Transformational Outcomes</b>
<b>Real Time Connectivity</b>	<b>Warfighters and other national security users can pull right information – right time – right format</b>
<b>Leverages Wide-Band SATCOM and GIG</b>	<b>Distributes maximum information through emerging Net-Centric capabilities</b>
<b>Optimizes wide range of</b>	<ul style="list-style-type: none"> <li>• <b>Formal and informal intelligence</b></li> </ul>

information for wide range of users	<ul style="list-style-type: none"> <li>• Global information translated</li> <li>• Collaborative technology integrates Communities of Interest</li> </ul>
Warfighters and other users are both producers and consumers of information	<ul style="list-style-type: none"> <li>• All authorized users have profiles</li> <li>• Content pulled by all authorized profiles</li> <li>• Users contribute to GIG virtual databases</li> </ul>
Information from all sources available to all (authorized) users	<ul style="list-style-type: none"> <li>• Operational intelligence data interoperability</li> <li>• Situational awareness at individual and organizational levels</li> <li>• Information for both strategic and tactical battle decisions</li> <li>• Rapid exploitation of information meets specific mission demands</li> </ul>
Anticipation	<ul style="list-style-type: none"> <li>• With the capacity of intelligence available on wireless laptops and handhelds to provide early and precise knowledge, battlefield intelligence analysis can result in U.S. force capability to “know more about the enemy’s operations than they do themselves.”</li> </ul>
Force Use Transformation	<ul style="list-style-type: none"> <li>• With anticipation capability, battlefield strategy transforms from “metal on target” to a range of Net-Centric options available to battlefield commanders and their troops, including capture, dissuade, align with humanitarian and Psychological Operations, or precision kill as appropriate</li> <li>• The new battlespace involves a much broader range of actors in addition to the Joint Services and intelligence operations, including other U.S. government agencies (Treasury, DEA, etc.), authorized diplomatic participants, and others</li> </ul>
Multiple levels of security opens access to authorized users	<ul style="list-style-type: none"> <li>• Trusted assured networks support Communities of Interest</li> <li>• Innovative technology provides broad access</li> </ul>
Force Transformation alters traditional culture to Net-Centric Global battlefield	All users align with information needs of Net-Centric Warfare

Source: Internal Horizontal Fusion Management document (MC/TM), additional documents (full list available).

### Criteria for the 03 Horizontal Fusion Portfolio Initiative

To provide maximum value to the Warfighters, to achieve actual results that can be transitioned to the battlefield, and to utilize fiscal resources as cost-effectively as possible, three criteria were used in selection of the initial 03 set of Portfolio Initiatives:

- **Fit:** How well Initiative products mesh to accomplish Portfolio results and work together to produce Net-Centricity, helping assure a harmonized, interoperable system.
- **Balance:** How well the Portfolio provides a wide range of value-added capabilities that create a useful set of tools for the access by Collateral Space users. For example, 10 initiatives that provide sensor input and no translation capability or indexing services would not be a balanced Portfolio. By contrast, the current Portfolio has a

wide range of sensor feeds, translation services, indexing services, and sense-making tools that will have operational synergistic effects.

- **Impact:** How useful and available Portfolio capabilities are for the actual Warfighters in the field.

Criteria for the 04 Initiatives are already in development and will be published by the Horizontal Fusion Initiative office in preparation for the next iteration of the Portfolio.

### **Guiding Principles for the 03 Horizontal Fusion Portfolio Initiative**

To accomplish the goals for Horizontal Fusion identified in the table above, several guiding principles were developed to create the Horizontal Fusion Portfolio Initiative:

- The Portfolio will follow an approach that encourages innovation, expects accountability, and allows for course corrections as necessary to achieve an operational demonstration of Portfolio capability.
- Portfolio management – at a practical, operational level – will mean making a shift to enterprise thinking in Portfolio development. Individual initiatives are to be integrated into an interoperable prototype system.
- The Horizontal Fusion Management and Integration Team will provide hands-on assistance for Portfolio Initiatives to establish a concept of operations for advanced Net-Centric operations.
- Success of the Portfolio means overcoming traditional isolation, disconnects, duplications, and gaps among programs and initiatives
- The Portfolio is intended to demonstrate actual performance for the principles of advanced Net-Centric operations.
- The 03 scenario demonstration of the Portfolio will identify gaps and opportunities in managing a Net-Centric portfolio.

Source: Internal Horizontal Fusion Management Team document (MC/TM/JL)

### **What Are the Unique Contributions of Horizontal Fusion?**

To achieve as bold, far-reaching, and urgent a strategic redirection of the battlespace as Transformation, many minds and efforts will be needed. Horizontal Fusion brings its own unique contributions.

According to Osterholz,

“The old way of doing interoperability by connecting individual data links between entities will not scale to the level we need to make Net-Centric operations work.

Proliferation of all these links would simply bankrupt (operations) and create an absolutely impossible engineering problem.

The solution is to move toward a fully Net-Centric, interoperable capability, creating net-ready nodes...The real interoperability issues in Net-Centric operations are no longer at the link level. They are at the data level.”

Source: “DoD Expects Industry To Help It Achieve Net-Centricity,” Government Computer News, Richard W. Walker, GCN Staff Writer, 23 September 2002, Interview with DoD Enterprise Architect John Osterholz - [http://www.gcn.com/21\\_29/management/20098-1.html](http://www.gcn.com/21_29/management/20098-1.html)

Horizontal Fusion provides a number of unique contributions toward Net-Centricity, including:

- Horizontal Fusion is targeted to serve as a proving ground for Net-Centric operations.
- The integrated Horizontal Fusion Portfolio provides a real-world “test-bed” and opportunity to leverage truly interoperable Net-Centric capability (vs. former approaches that tended to be stovepiped and platform-centric).
- Horizontal Fusion allows tracking of an emerging, continuing capability, as the Portfolio approach matures and evolves over the five-year rollout of the Initiative.
- The Horizontal Fusion Portfolio Initiative provides a proof of concept and a demonstration with the goal of transferring interoperability to the battlefield.

Source: Horizontal Fusion Integration Team and SPAWAR Team, 31 January 2003.

### **Key Advances in Net-Centricity “Seeded” through FY03-04 Horizontal Fusion Portfolio: Technical and Business Process Enablers**

As a test-bed for Net-Centric operations, the Horizontal Fusion Portfolio will operationalize certain specific technical and business process elements of Net-Centricity. These elements include:

- Creation of a shared Collateral Information Space with Net-Centric standards. The resulting C2 and ISR Collateral Space Portal will have expanded sources, resources and support, greater collaboration, and vertical and horizontal information sharing and synergy.
- User profiles that allow information that is for specific situational awareness at the right time.
- Through the NORA capability, close scrutiny of non-obvious relationships allows rapid and accurate discovery of critical relationships, identification of

possible terrorist activities or interpretation of the battlefield, as needed, and then rapid deployment of effective response.

- Active collaboration through dynamic Communities of Interest (COI) focused on joint problem-solving in real-time.
- Development of Core Enterprise Services in support of these COI.
- Multi-level and multi-process discovery will be possible through access and integration of multiple search engines, access to indexes of data and databases, and rapidly available analysis.
- Enabling intelligence analysts to fuse information and provide users with dynamic battlespace visualization.
- Standards for multiple levels of security to allow for the transfer of targeted, focused intelligence, expanding access to a broader range of available critical information.
- Adaptation of commercially available applications to heighten capacity for analysis of critical correlations that will better inform battlespace commanders and other users.
- Sharing high-value, low-latency surveillance and reconnaissance data

### **Transformational Benefits of the Horizontal Fusion Portfolio Initiative**

The Portfolio Initiative, through creating a demonstration vehicle for Net-Centricity, provides a number of Transformational advantages:

- Focuses on the needs of Joint Forces commanders and battle staff.
- Provides information for operations against a wide range of threats.
- Provides integration and analysis of multiple-source information to a command and control decision in a greatly reduced timeframe.
- Supports changed methods of warfighting.
- Application of portfolio management develops processes to examine existing intelligence community and DoD programs for rapid expansion to the Net-Centric environment.
- Analyzes existing and new initiatives for alignment with advancements in decision support.

- Expands a model for an effective Concept of Operations for the full range of DoD Communities of Interest.
- Creates an environment that values feasible, workable, validated solutions for Net-Centric Warfare.

Source: Internal HF Management documents (MC/TM/JL)

## **Summary**

Force Transformation depends on the acquisition and application of the continuously emerging Net-Centric technology. Beginning with the 03 demonstration, Horizontal Fusion is targeted to transition that technology to the operational forces.