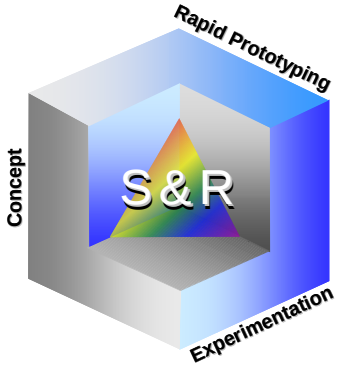
OPERATIONAL SENSE AND RESPOND LOGISTICS:

CO-EVOLUTION OF AN ADAPTIVE ENTERPRISE CAPABILITY



CONCEPT DOCUMENT

17 NOVEMBER 03

OFFICE OF FORCE TRANSFORMATION

TABLE OF CONTENTS

LIST OF FIGURES iii

LIST OF TABLES iii

1 THE MILITARY PROBLEM 1
- **1.1** The Emerging Global Security Environment 1
- **1.2** Transformational Military Concepts 1
- **1.3** Operational Context 2
- **1.4** The Logistics Challenge 2

2 THE CONCEPT OF SENSE AND RESPOND LOGISTICS 3
- **2.1** S&R Business Analogs 3
- **2.2** S&R and the Power of the Network 4
- **2.3** Assumptions and Interdependencies 8

3 COMMAND AND CONTROL 9

4 CO-EVOLUTION OF AN ADAPTIVE ENTERPRISE CAPABILITY 10

5 S&RL CAPABILITIES AND ATTRIBUTES 10

6 ENDNOTES 14

LIST OF FIGURES

Figure 1. End-to-End Sense and Respond, from Point-of-effect to Source of Support 6

LIST OF TABLES

Table 1. Logistics: Pre- and Post-Transformation 8
Table 2. S&RL Capabilities and Attributes Matrix 13

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1 THE MILITARY PROBLEM

1.1 The Emerging Global Security Environment

The emerging global security environment represents a new set of challenges and threats, and fundamentally changes the rules of how America fights its wars. The new threats are broader and include global, regional, and local elements. They are non-state, multi-dimensional, flexible, distributed, information-aware, and rapidly adapt to U.S. strategies and tactics. They are unconstrained by the values that guide America's approach to warfare. Increasingly, these threats have at their disposal asymmetric, inexpensive, and competitive methods of creating large-scale effects.

While some of the traditional American approaches based on enduring values and national wartime experiences will remain (e.g., minimization of casualties and collateral damage on all sides; establishment of unity of command), the *new American way of war* must be recognized and guide new concepts. These new rules are transforming Defense strategy.

1.2 Transformational Military Concepts

The transformational military concepts to meet the emerging global security environment include:

- Fight first for ***information superiority***
- ***Speed*** of command
- Access to information and ***shared awareness***
- ***Dispersed forces*** and non-contiguous operations
- ***Demassification***
- Elimination of ***process lines*** (e.g., organize, deploy, employ, sustain; operations, intelligence, logistics)
- Elimination of ***structural lines*** (e.g., Joint operations at the small unit level)
- Dynamic ***self-synchronization***
- ***Alter*** initial conditions
- Develop ***high rates of change***
- ***Compression*** of the levels of war

These objectives are integrated using, as a framework and infrastructure, the theory of Network-centric Warfare (NCW). It accommodates the critical elements of high rates of change, closely coupled events, lock-in/out, speed of command, and self-synchronization. In the NCW environment, values are:

- Networking
- Sensing
- Envelope Management
- Speed/Endurance
- Numbers
- Risk Tolerance
- Staying Power

Network-Centric Warfare leverages information-age concepts in the evolving strategic environment, enabling dispersed, semi-autonomous combat capability packages that produce coherent, mass effects via speed and coordinated efforts.

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1.3 Operational Context

These concepts contribute to a transformational operational context that allows more options to deter forward or defeat with modest reinforcement. By altering the initial conditions, the effect can be a change in the enemy's context. *Operation Iraqi Freedom* (*OIF*) demonstrated numerous examples of the benefits of increasing the speed of command. There are also examples of how a networked, distributed force contributes to more rapid force projection as well as increasing complexity and ambiguity. The recent operations in Afghanistan, Iraq, Liberia, and Bosnia, as well as the emergence of Homeland Security, point to the requirement for support across a diverse and full range of military operations.

Effects-based Operations (EBO) includes continuous effects-based planning and execution, configuration, adaptation, and on-the-fly reprioritization of Joint capability packages and resources required to generate effects. EBO covers both kinetic and non-kinetic effects, and is not limited to implementation through traditional military organizations.

Joint Adaptive and Joint Expeditionary Warfare requires capabilities organized cross-enterprise, adapting dynamically to uncertainty and turbulence in an multi-dimensional, nonlinear, competitive environment. These capabilities must be applicable to the full spectrum of military operations. Integration of warfighting operations includes integration of processes in the traditional domains of Command and Control (C2); Logistics, Operations, and Intelligence; Surveillance; Reconnaissance; and integration of strategic, operational, and tactical levels of war. Under this approach, dynamic decision support—course of action analysis, knowledge management and mining, pattern recognition, learning, and other cognitive decision support tools—becomes critical. Other consequences of Joint Adaptive/Expeditionary Warfare include rapid decisive operations of a smaller number of more lethal and rapidly deployed forces, a flattening of the command hierarchy, task/mission/effect organization of forces, and a shorter timeframe for intensive conflict operations.

These transformational operational capabilities include maneuvering directly on objectives from operational and strategic distances without fixed intermediate bases or RSOI (force-to-objective maneuver [FTOM]). It also implies the capability to organize/deploy/employ/sustain/reconstitute in a single, continuous process. Operations will be conducted in non-contiguous battlespace with no secure rear areas and without pause. This assumes flexible operations basing, especially for littoral warfare. Concepts supporting these objectives include Operational Maneuver from the Sea (OMFTS), Sea-Basing, and Ship-to-Objective-Maneuver (STOM).

As DoD adapts on the Operational front to the new challenges and adopts the theory of NCW and the practice of Joint Adaptive Warfare, Logistics becomes more of a challenge. Military Operations are increasingly becoming, and must become more, non-linear, distributed, and adaptive. In general, Military Logistics is organized hierarchically and linearly, and does not adapt well to dynamic battlespace events. Recent *OIF* situations suggest that this resulted in an undesirable *Operational Pause*.[i]

1.4 The Logistics Challenge

Historically, military logistics has taken a mass-based approach to satisfying operational needs and has generated *iron mountains* of equipment, commodities and items, and has employed the measure of effectiveness of days of supply. Mass may still continue to work where demand is predictable or *stable* and if the situation permits time to build up logistics where there is little risk of having stockpiled unusable or excess items. Just-in-time logistics was an attempt to apply commercial practices to lean-out the inventory and make the logistics system more efficient. Its prime metric was *flow time* or *flow rate*. Just-in-time works well but creates a very brittle supply chain that is at much higher risk in a dynamic environment due to inflexibility, vulnerability to

damage and destruction, and potential inability to service dynamically generated, prioritized needs.

Current efforts to modernize logistics focus on increasing system efficiency, reducing the mobility footprint, implementing performance-based contracts, and creating transactional data-sharing environments. Enterprise resource planning (ERP) systems, which have worked (in some cases) in the commercial sector, are being applied to DoD logistics.

However, the latest modernizing approaches will not yield the kind of adaptive, effects-based logistics system that will support highly modular, dynamic, distributed, adaptive operations. The current logistics concepts yield predictive, optimized, linear supply chains that operate in traditional, hierarchical C2 structures. Logistics support in a transformed military and defense will require:

- Logistics operations in a networked, distributed force that emphasizes speed of command and adaptation
- Focused force-centric logistics for tasks, missions and effects, as opposed to the optimization of logistics supply
- Logistics support for rapid force projection and rapid, decisive operations of expeditionary forces (FTOM)

2 THE CONCEPT OF SENSE AND RESPOND LOGISTICS

Sense and Respond Logistics (S&RL) is envisioned as an approach that yields adaptive, responsive demand and support networks that operate in alternate structures that recognize operational context and coordination. The prime metric for S&RL is *speed/quality of effects*. The concept of S&RL is defined as follows:

Sense and Respond Logistics

Sense and Respond Logistics is a transformational network-centric concept that enables Joint effects-based operations and provides precise, agile support. Sense and Respond Logistics relies upon highly adaptive, self-synchronizing, and dynamic physical and functional processes. It predicts, anticipates, and coordinates actions that provide competitive advantage spanning the full range of military operations across the strategic, operational, and tactical levels of war. Sense and Respond Logistics promotes doctrinal and organizational transformation, and supports scalable coherence of command and control, operations, logistics, intelligence, surveillance, and reconnaissance.

Implemented as a cross-service, cross-organizational capability, Sense and Respond Logistics provides an end-to-end, point-of-effect to source-of-support network of logistics resources and capabilities. Within Sense and Respond Logistics, every entity, whether military, government, or commercial, is both a potential consumer and a potential provider of logistics. It delivers flexibility, robustness, and scalability for Joint expeditionary warfare through adaptive, responsive, real-time, demand and support networks within U.S., allied, and coalition operations.

2.1 S&R Business Analogs

Sense and Respond Logistics, as previously described, is grounded in NCW theory and Joint Adaptive Expeditionary Warfare practice. It also borrows, with modification, ideas from commercial analogs, particularly an S&R adaptive managerial framework originally developed by IBM.

Some of the key ideas of Sense and Respond, which can be found in the business literature and practice, reflect the application of network-centric theory and principles, including:

- The assumption that demand is ultimately unpredictable, so success depends on speed of pattern recognition and speed of response
- The best supply chain is no longer *highly optimized*; it is *highly flexible*
- Organization of business units and subunits into *modular capabilities* that negotiate with one another over commitments
- Networks self-synchronize via a common environment and set of shared objectives; typically command intent and mission/task/effect satisfaction measures
- Dependence on sophisticated IT support to enable data sharing, *knowing earlier*, commitment tracking, and role reconfiguration

2.2 S&R and the Power of the Network

The Sense and Respond Logistics Concept is based upon the power of the network. At the business end, the connections are natural to reconfigure or change flow. S&RL has several strengths and attributes of the network:

- The support network is dynamic
  - Support doctrine anticipates event-driven, reconfigurable support nets
  - Emphasizes distribution flexibility and support network responds to need
- Relationships are negotiation-based
  - All entities use commander's intent, planned effects, and detailed situation awareness to negotiate and synchronize
  - Roles and commitments of entities are dynamically defined within a specific context
  - All entities are described in terms of current capabilities; not as static forces
- Networks are robust and difficult to analyze and attack
  - More robust to node failure
  - Adapts to real-time demand signals
- S&RL supports distributed, adaptive operations
  - Network adaptation allows logistics decisions to be made continuously and anticipatorily
  - Emphasis on information and distribution allows a greater degree of operational flexibility and risk management
  - No pause – log does not constrain ops speed
  -
  - Mechanisms are transparent to warfighters; but results are very apparent

Sense and Respond Logistics, because of these attributes, becomes a potential source of operational advantage and a capabilities multiplier for operational forces. S&RL provides this capability multiplier effect by providing earlier to the Operational Commander an increased range of support options that are synchronized with the operational effects. S&RL can also anticipate support problems, identify potential constraints earlier, and respond to changes in operational tasks and reprioritization.

S&RL is addressing the following support issues:

- **Adaptability and speed**: Logistics demand is ultimately unpredictable. Effective support depends on adaptability and speed of response. Logistics networks should self-synchronize through a common environment and set of shared objectives to achieve satisfaction of operational requirements, at the point-of-effect

- **Flexibility**: Sustainment of military operations is most effective when the supply chain is highly flexible rather than highly optimized
  - Negotiations for logistics resources and capabilities should be encouraged to support rapidly evolving tasks and effects-based operations
  - Distribution and transportation of support should be independent from geography constraints where possible
- **Modularity**: Modularity implies visibility into logistics support organized by modules of support capabilities rather than by traditional service and organizational elements
- **Integration**: Cohesive, adaptable, and responsive logistics requires sophisticated IT support that enables data sharing, a common perspective of the battlespace, early awareness of resource consumption and needs, commitment tracking, and support for reconfiguration
  - Options for military tasks and effects should be provided through analysis of support capabilities, and operational risk due to logistics must be recognized and mitigated

Figure 1 depicts the concept of an S&RL capability that operates end-to-end, from *point-of-effect* through *source-of-support.* The point-of-effect (denoted by stars in the Joint Operations Area [JOA]) is where the demand process starts (it does not start at the platform). The point-of-effect is where the pure demand process starts and where the ultimate customer is the enemy/enemy's behavior that we are trying to change by creating an effect (which may not be kinetic or may not even be military, and may be implemented through another national asset). If the enemy is the ultimate customer in this model (or the customer's customer in SCOR terminology), the customer to the support network is the operational commander and the commander's intent. Effects are generated by capability packages, which, in turn, are composed of entities that create resource demands. The points-of-effect, the capability packages, and the resource consumption/demand nodes together represent the demand network.

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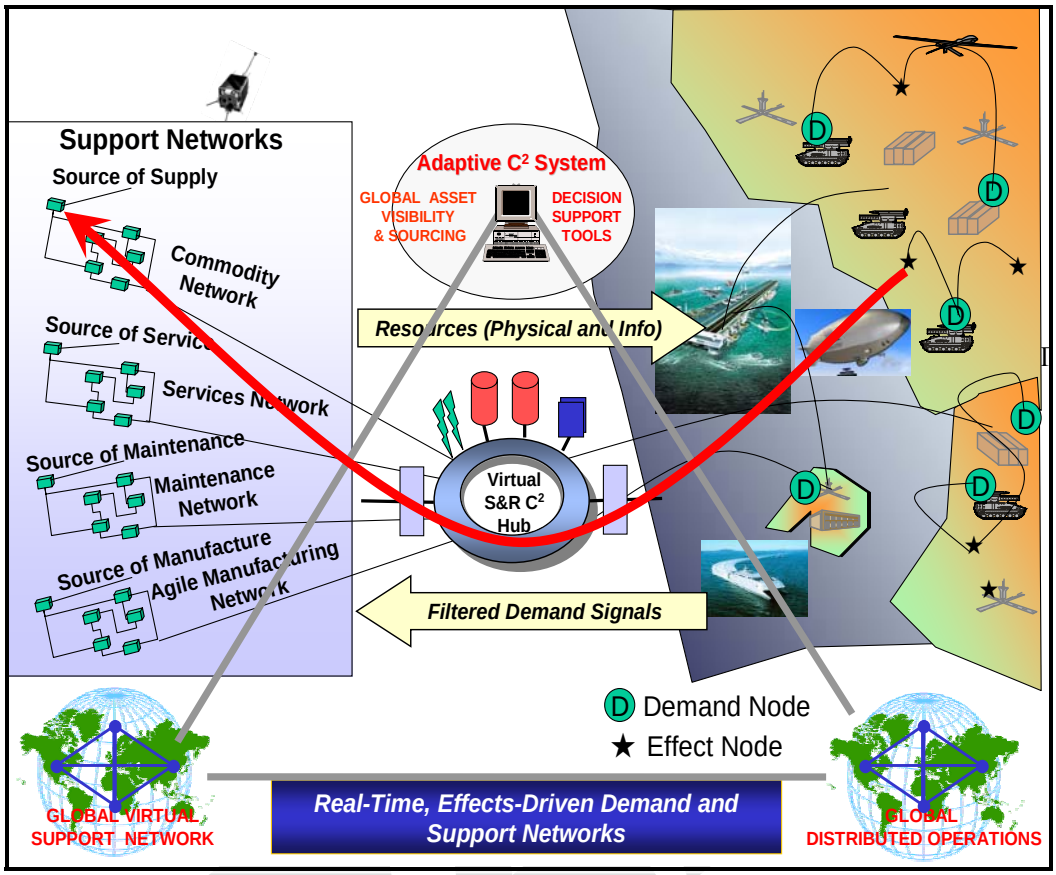

Figure 1. End-to-End Sense and Respond, from Point-of-Effect to Source of Support

The area between the points-of-effect and the resource demand signals (in Figure 1, the area between the stars and the D-nodes) is the *Logistics No-Man's Land* and is the least understood, but highest potential payoff area for understanding and linking effects-based operations and Logistics. Part of the challenge of building the S&RL system is traversing this area and linking effects and resource demands directly.

The support network comprises all nodes involved in responding to needs. It includes not only traditional supply chain nodes, but also any node or potential node capable of satisfying that need. In this definition of the support network, even demand nodes under certain conditions become potential sources of support, as do commandeered assets, coalition assets, etc. There are different kinds of support networks that must be accommodated. These include commodities, services, maintenance, and manufacturing. Implied but not shown in Figure 1, the support network includes distribution services, including transportation services.

The S&R C^2 hub is the virtual cross-roads (the technical and system architectures would ensure that this hub is not a single-point-of-failure vulnerability in the infostructure supporting S&RL) where standards-based transactional information would flow through in real-time to send (filtered) demand signals back to the support networks and send status and constraint information from the support network to the demand network. Lessons learned and experience feedback loops would assist in adaptation of logistics support strategies over time to meet dynamically evolving command intent.

The S&R C^2 hub is a part of an enterprise-wide Joint Dynamic Adaptive Command and Control System (DAC^2) that embodies NCW principles, synchronizes Ops, ISR, and Log, and supports

planning and execution Joint Adaptive Warfare. Real-time information flows will link global support networks with total asset and process visibility and global anticipatory demand networks to support effects-based operations and provide a constantly adapting enterprise capability.

The concept for Operational S&RL includes:

- Networked adaptive logistics supported by a community of software agents that represent logistics suppliers, consumers, and resources
  - Logistics resources include consumables, spares, services (health, maintenance, repair, etc.), tools, transportation, and facilities
  - Sense and respond mechanisms identify (sense), request (demand), and support (supply) logistics needs
  - Full battlespace perspective of potential and opportunistic consumers, suppliers, and logistics transportation and distribution (including logistics resources outside the supply chain)
  - Adaptation managed by business rules, current situation, and command guidance and direction
  - Using situational awareness and command intent (plans, orders, tasks, effects, targets) to assess, prioritize, and reduce risk in sense and respond logistics
  - Using feedback, lessons learned, and experience from the agents to adapt the logistics effort, primarily through continuous planning, short-term supply chain optimization, and supply chain event management
- Real-time logistics management and control
  - Real-time adaptation of current logistics operations and logistics plans
  - Event-driven supply chain and supply chain event management
  - Short-term inventory optimization
- Seamless logistics through instrumented Total Asset Visibility
  - RFIDs, electronic Product Codes (ePCs), extended to DoD Logistics
  - IDs for logistics services, tools, and facilities
  - Cross-organization, cross-service, cross-ally, cross-agency logistics visibility and access, plus host-nation and opportunistic logistics resources
- Integration of the global sustaining base with logistics in the battlespace
  - Direct connection, adaptation with logistics suppliers (factories, depots, manufacturers, contractors)
  - Use of CONUS/OCONUS suppliers
  - Seamless Logistics from point-of-effect to factory
- Focus on what logistics does to ensure reducing risks and meeting operational objectives, vs. logistics optimization
  - Logistics adaptation controlled by command intent (orders, tasks, missions, effects)
  - Joint capabilities packages, task and effects packages, mission and task packages
  - Operational risk mitigation through logistics
- Dynamic, continuous, integrated logistics planning
  - *Prediction* of a full range of potential operational COAs
  - *Anticipation* of a resultant subset of potential logistics COAs, based on risk assessment and risk mitigation
  - Continuous logistics awareness, coordination, and support of operational and intelligence planning, tasks, and objectives
- Logistics management of information, communications, and processing resources

- Flexible basing and forward provisioning, including sea-basing, to support STOM, FTOM, and operational maneuver-from-the-sea (OMFTS)
- Logistics-related cognitive decision aids (automated computer processes) that support logistics operations and decision-making
- Integration of logistics functions with operations and intelligence functions, providing proactive support to command decision-making

Table 1 summarizes the characteristics of the logistics enterprise, pre- and post- transformation.

Table 1. Logistics: Pre- and Post-Transformation

Pre-Transformation	Post-Transformation
Linear	Non-linear
Chains	Networked
Use-Based	Effects-Based
Service Stovepipes	Cross-Service Mutual Support
Functional Stovepipes	Cross-Enterprise
Title Ten-Driven	Joint Logistics
Pre-Planned	Dynamic Continuous Planning & Execution
Poor Ops/Log ISR Integration	Net Warrior Ethos
Reactive	Anticipatory
Parametric Analysis-Based	Collaborative
Hierarchical	Networked
Monolithic	Distributed, Modular
Poor Scalability	Dynamically Scaleable
Not Flexible	Flexible
Consumption-Based	Adaptive, Cognitive
Mass	Speed of Effect
Attrition	Effects-Based
Service Perspective	Joint Coherence
Efficiency	Effectiveness
Highly Optimized	Effective
Brittle, Rigid Supply Chains	Robust, Flexible Demand Networks

2.3 Assumptions and Interdependencies

The target timeframe for the full implementation of all elements of Operational Sense and Respond Logistics may be any time from 2010 to 2015. This could be much sooner, however, depending on the rate of transformation of the DoD. The main reason for the long length of time is the assumption that full capability will require certain other elements that are not slated for completion until that time frame. Elements of the concept could be employed in an evolutionary, spiral development in the very near-term, resulting in immediate operational gains.

Assumptions and interdependencies from military operations transformation concepts include:

- Agents will represent command intent (plans, orders, tasks, missions, effects)
- The cognitive decision support algorithms necessary to calculate operational worth and value, to predict and anticipate opposing force operations and the strategic, operational, and tactical situation, and to generate and evaluate courses of action, will exist
- *Blue Force Tracker* exists for all operational, logistics, intelligence elements
- Net-centric Enterprise Services (NCES) and National Information Infrastructure (NII) exist as backbone for Network-Centric Operations

- Coordinates and controls access and availability of global information, communications and computer networks, and processing resources
- Provides post-publish-subscribe functionality for knowledge, information, data, state
- Provides access to compute-intensive cognitive decision aids (e.g., Course of Action analyzers, knowledge mining tools)
- Infrastructure is self-adaptive, self-healing, secure

Advanced logistics operations assumptions and interdependencies include:

- A common logistics operational picture exists
- Service and major ally logistics, operations, and intelligence systems and information will be interoperable, and interconnected
- ePCs and RFIDs will be used for all logistics resources and defined for logistics services, transportation assets, tools, and facilities
- Most military end-items and systems (even warfighters) will be equipped to sense potential component failures or consumables status
- Globally accessible databases correlating ePCs and RFIDs to logistics items will exist
- The acquisition/contracting enterprise architecture is compatible with S&RL and accepts lessons learned and feedback to adapt logistics supply chain
- Autonomic Logistics will be supported at factories, suppliers, manufacturers, contractors
- Agreements exist with sustaining base elements (manufacturers, suppliers, contractors) to interface with S&RL and to provide direct connection from point-of-effect to factory

3 COMMAND AND CONTROL

Network-centric Warfare and Joint Adaptive Warfare have significant implications for C2, organizational models, culture, training, and education. Logistics, Intelligence, Surveillance, and Reconnaissance (ISR), Operations and C2 become one continuous process rather than functional and process stovepipes. Individuals will become educated and trained primarily as net-centric warriors who embody the adaptive ethos first, and are functional or technical specialists second.

The organizational design implications for are those we would design to support:

- Massively distributed decision-making
- Local self-synchronization
- Shared situational awareness
- Speed of Command
- A high degree of coherence in creating effects linked to a larger security outcome

Organizational and professional skills will potentially include new core competencies:

- Knowing earlier
- Managing by wire
- Designing a business as a system
- Dispatching capabilities from the customer request back
- Context-giving leadership

With these kinds of attributes and competencies, the benefit is that the system can generate coherent organizational-level behavior at scale. This coherent system-level action is enabled by the fact that the *who-owes-what-to-whom* Role and Accountability design is a system design, and by the commitment management support system that ensures that all agreed outcomes are inspected for consistency with the current rules of engagement (ROEs) (Governing Principles plus lower-level spins and tweaks).

4 CO-EVOLUTION OF AN ADAPTIVE ENTERPRISE CAPABILITY

Co-evolution techniques guide S&RL development and the transformational approach to instantiating these capabilities. The techniques are used to stimulate disruptive innovation through the continuous development and refinement of concepts, processes, technologies, and organizations. The objective is to start influencing change immediately. Co-evolution threads and their meaning for S&RL are:

- **Conceptual**: Articulates the formal vision of S&RL and drives operational and tactical implementation strategies and near- and long-term actions
- **Enterprise Architecture/Process**: Provides operational, systems, and technical guidance for the development and implementation of the S&RL IT prototype
- **IT Prototyping**: Represents the physical manifestation of the S&RL concept, architecture, and process; comprised of a network-centric enterprise integration framework and set of applications, information content, and linkages that reside and evolve within the framework; facilitates analyses, modeling, hypothesis testing, and experimentation
- **Experimentation**: Provides a venue for evaluating the S&RL concept and the IT Prototype, and provides insights that can be used to refine the concept in an iterative fashion
- **Transition Planning**: Ensures that, as the concept matures and benefits are demonstrates, capabilities can be quickly transitioned to appropriate organizations and embedded in the fabric of DoD

Co-evolution starts with, and is driven by, the Strategy and Concept. Co-evolution extends beyond spiral development and works the aforementioned elements simultaneously. The S&R Experimentation Framework is the mechanism to take the concept and the co-evolving work and put it into an experimentation venue(s) to validate emerging hypotheses and techniques of S&RL. Finally, these approaches will eventually yield implications across DoD and beyond, which will influence technology, policy, acquisition, and the private sector. These changes will broaden the industrial base through public-private partnerships and increase U.S. core competencies that will lead to an increase in competitive advantage.

5 S&RL CAPABILITIES AND ATTRIBUTES

Capabilities of a transformational Sense and Respond Logistics will support:

- A larger set of potential suppliers, logistics resources, and real-time opportunistic access to those suppliers
  - Logistics consumers can be suppliers
  - Cross-organization, cross-service, cross-ally resources
  - Dynamic redirection of resupply, supply chains, logistics plans
  - Host-nation, indigenous, and OCONUS commercial resources

  - Captured enemy resources
  - Opportunistic transportation and distribution
- Full consideration and adaptation of logistics tasks, including transportation, distribution, and requisite maintenance resources (mechanics, tools, facilities)
- Integration of logistics with operations, intelligence functions, with logistics resource decisions based on strategic, operational, tactical situation awareness, and brokering, negotiation, and arbitration based on current operational tasking, plans, orders, and effects (Logistics as an enabler for operations, providing command with options)
- Full acceptance and implementation of effects-based operations, planning, logistics, and targeting
- Logistics resource visibility, and dynamic logistics adaptation based on feedback/lessons learned, with logistics effort viewed, adapted from point-of-effect to logistics supplier
- Adaptation within the full range of military operations, including point-of-spear to peacetime (garrison, on-station, training) to infrastructure (standing headquarters, agencies), and support for research and development, adaptive acquisition and contracting, and adaptive health services
- Network-centric warfare early implementation, as well as acceptance of its principles and methods

These capabilities are the minimum required to implement an S&RL system. Sense and respond logistics will provide the ability to:

- Provide adaptive logistics between battlespace entities and the support network in a Joint/Coalition Expeditionary/Adaptive Warfare context
- Operate within a network-centric enterprise framework, integrating logistics, operations, ISR, and C2
- Provide logistics support for effects-based, distributed, collaborative operations
- Support and enable rapid decisive operations via flexible projection, basing, and sustainment
- Provide end-to-end visibility for logistics resources (including process capacities)
- Provide adaptive logistics support across the full range of military operations
- Dynamically tailor modular logistics support to specific capabilities, mission, tasks, and effects
- Configure and manage adaptive support networks to rapidly respond to events and operational needs
- Predict and anticipate logistics support requirements and alternative solutions
- Provide operational commanders with support options based on adaptive logistics
- Fully integrate logistics processes with Operations, ISR, and C2
- Adapt logistics support using concurrent, real-time awareness of strategic, operational, and tactical situations and objectives
- Manage and situationally adapt communications, processing, and information resources
- Assure the operation, integrity, and security of the network infrastructure
- Use objectives and planned effects to support decision making and risk management
- Integrate CONUS, OCONUS, host-nation, indigenous, and allied logistic resources
- Support decision-making with cognitive decision support tools

For each of the key S&RL capabilities, there will be testable or measurable attributes. These include:

- Network-centric
- Adaptable
- Speed versus Mass
- Cognitive Decision Support
- Predictive and Anticipatory
- Tailored and Precise
- Non-linear
- Peer-to-peer and Brokered
- Fully Integrated
- Robust
- Transformational

Table 2 illustrates the relationships between the attributes and capabilities of S&RL. For each attribute, standards will be established in the context of specified conditions. These metrics will be specific, measurable, relevant, and simple.

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Table 2. S&RL Capabilities and Attributes Matrix

	Network-centric	Adaptable	Speed vs. Mass	Cognitive Decision Support	Predictive and Anticipatory	Tailored and Precise	Non-linear	Peer-to-peer and Brokered	Fully Integrated	Robust	Transformational
Provide adaptive logistics between battlespace entities in a Joint/Coalition, Expeditionary/Adaptive Warfare context	X	X	X			X	X	X		X	X
Operate within a network-centric enterprise framework for logistics (and Ops, ISR, & C2)	X	X								X	X
Provide logistics support for effects-based, distributed, collaborative operations		X	X				X	X			X
Support and enable rapid decisive operations via flexible projection, basing, and sustainment		X	X			X	X			X	X
Provide end-to-end visibility for logistics resources (including process and logistics service capacities)	X								X	X	X
Provide adaptive logistics support for the full range of military operations		X				X	X				X
Dynamically tailor modular logistics support to specific capabilities, missions, tasks, effects		X	X			X	X			X	X
Configure and manage support networks to rapidly respond and adapt to events and operational needs	X	X	X			X	X	X		X	X
Predict and anticipate logistics support requirements based on experience, feedback, lessons learned, and situation awareness	X	X		X	X		X				X
Provide operational Commanders with support options based on adaptive logistics		X	X	X	X	X	X		X		X
Fully integrate logistics with Operations, ISR, and C2	X						X		X		X
Adapt logistics support using concurrent real-time awareness of strategic, operational, and tactical situations and objectives	X	X	X	X	X	X	X	X	X	X	X
Manage and adapt situational performance of communications, processing, and information resources	X	X			X	X				X	X
Assure the operation, integrity, and security of communications, processing, and information resources	X	X								X	X
Use objectives and planned effects to support decision-making, and risk assessment/mitigation		X		X	X		X				X
Integrate CONUS, OCONUS, host-nation, indigenous, and allied logistics resources		X							X	X	X
Support decision-making with cognitive decision support tools	X			X	X		X				X

6 ENDNOTES

[i] The following excerpts from The March Up: Taking Baghdad with the 1st Marine Division, illustrate the problem of Logistics causing an operational pause.

> "After the dust storm, the loss of helicopters, and the extended battle around Najif, the CFLCC staff understood that V Corps needed to stop for fuel, ammunition, water, and food. That required time. In addition, two Army brigades were to be positioned in the south, to guard the rear against Fedayeen attacks. That two required time. Halting the ground attack to the north thus made sense for V Corps. I MEF was a different story. Lieutenant General Conway had no request from the 1st Marine Division to stop and resupply. Its regiments needed and expected no pause…
>
> The CFLCC had designated V Corps as the Main Effort, making the marines the Supporting Effort…
>
> But now that V Corps had to stop, the Main Effort could fall to I MEF, and the 1st Marine Division could continue the attack. Alternatively I MEF could agree to a mutual halt. That way V Corps and I MEF would stay on parallel tracks…
>
> The 1st Marine Division did not need to halt for supplies, and it had momentum. But the needs of others had to be considered…Gen Conway informed CFLCC that he would halt the 1st Marine Division. Late on the afternoon of 27 March, the MEF officially informed the 1st Marine Division that it was to pause [day 6-12]." Pg 83
>
> "There was a service tinge to the differing perspectives based on how they packaged their logistical support. The Marines were accustomed to bare bones expedition, and [Major General] Mattis through LOGLITE had further stripped down the division." Pg 102
>
> "…the CFLCC staff entertained options of extending the pause over a longer term. The President put a stop to that." Pg 107

Bing West and Major General Ray L. Smith, The March Up: Taking Baghdad with the 1st Marine Division (New York: Bantam Books, 2003) 83, 102, 107.

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