

# The SSC San Diego Concept of the Composeable FORCEnet



By the SSC San Diego Composeable FORCEnet Team

In describing his vision of the Navy of the future, Sea Power 21, Chief of Naval Operations, Adm. Vern Clark, cites three fundamental concepts: unprecedented offensive power, which he terms Sea Strike; defensive assurance or Sea Shield; and operational independence or Sea Basing.

Adm. Clark states that the architecture and the enabler to achieve Sea Power 21 is FORCEnet, “an overarching effort to integrate warriors, sensors, networks, command and control, platforms and weapons into a fully netted combat force.” FORCEnet, he says, is the Navy’s means to make network-centric warfare an operational reality.

Initiating what the CNO has characterized as “the best example of a fully netted force that I’ve ever seen,” innovative technical personnel of the Space and Naval Warfare Systems Center San Diego fashioned a vision for an essential supporting concept — the “Composeable” FORCEnet. The team believes this capability will provide joint warfighters operating in a FORCEnet-enabled environment, superior decision-making capability enabling the joint force commander to achieve full spectrum dominance.

The key word in this construct is composeable because commanders must have the ability to compose a command and control capability that meets their warfighting requirements from a broad array of components, including multitiered networked platforms, sensors and dynamic bandwidth capabilities — all with the capability to interpret and create any visualization to meet mission requirements. This will provide the framework to achieve fast, flexible and agile speed to capability in the face of rapidly evolving threats and missions — enabling commanders to make informed decisions.

To illustrate this concept, the SSC San Diego team developed a demonstration, which has been shown to visitors at the center, including Adm. Clark, and to large audiences at various joint technical conferences and trade shows. The demonstration, based on a simulated scenario, illustrates the capabilities that evolving Web technologies provide when applied to warfighting. During the demonstration, the underlying conceptual framework is



*With the opening of the Composeable FORCEnet Human Systems Integration (CFnHSI) Laboratory, SSC San Diego has expanded testing and evaluation capabilities to address human performance as part of FORCEnet.*

described, the functionality provided by Web services and tools is shown, and this functionality is then applied to several operational missions to demonstrate the warfighting implications of the concepts.

“If the engineering community can provide a capability that enables a warfighter to compose the C4ISR capabilities needed at a particular place, at a particular time, to deal with a particular operational challenge, in other words, ‘on the fly,’ then we will have provided our military with the means to achieve maximum agility and effectiveness against any threat,” said Jeff Grossman,

one of the SSC San Diego technical leaders developing the Composeable FORCEnet.

The complexities of FORCEnet will require substantial time and effort to instantiate a final engineering architecture for a robust, survivable system. As a result, SSC San Diego personnel believe demonstrating an early instantiation of Composeable FORCEnet is important to enable Defense Department and DON decision makers to fully appreciate “the art of the possible” regarding what it can deliver to the operational commander.

Two key concepts are emphasized with Composeable FORCEnet. One is the concept of composeability, which is the ability to compose warfighting capabilities from Web-enabled information and systems, Web services and Web tool components. The second concept is to provide mechanisms to transform fused data into information of known pedigree and then into actionable knowledge in a manner that directly supports decision making at all levels of command.

Composeable FORCEnet can dramatically change C4ISR operations by providing the means to achieve shared awareness through an intuitive, map-based operational picture where information from any source may be geo-referenced, and anyone with appropriate permissions can participate in collaborative sessions. The following are examples of the functionality that SSC San Diego has demonstrated using the composeable concept.

✓ Provides the ability to represent multidimensional aspects of the operational picture using a geo-spatial reference

environment — a map metaphor. This provides decision makers with the ability to interact with information in a familiar and intuitive environment.

✓ Users can place any Internet address on a geographical location; overlay high-resolution maps and images, which can include elevation data on locations of interest; and even drag and drop data and documents (e.g., Microsoft Word) onto the map.

✓ Users can integrate searches of Web content that can be linked to the map or objects on the map by the user, which can subsequently be shared with other users.

✓ Users can tailor any representation with the intuitive and interactive interface based on well-known metaphors, such as Web browsers, search tools and graphical user interfaces. This dramatically reduces training requirements.

✓ Provides a representation of information, allowing both access to and the ability to manage data through several key human-computer interface metaphors. The central metaphor — a map is based on the recognition that warfighters have historically planned and executed operations using a map — the metaphor for actual geo-space.

The use of electronic-based maps, together with Web tools and services, opens up new opportunities for expanding the map metaphor into an extensible, adaptable, pluggable new human-computer interface for FORCEnet. A second human-computer interface metaphor is the browser. Over the past several years, the concept of hyperlinked information available through “point and click” manipulation has become commonplace.

One of the current browser interfaces used in the Composeable FORCEnet demonstration was adapted from another SSC San Diego project, known as Knowledge Web. It is based on client-server architecture and provides an organization, notably a military command staff, with speed-to-decision capability through the ability to post information to a server available to authorized individuals continuously, rather than at specified briefing times. Significantly more information is available — more widely and more quickly than ever before.

Moreover, consumers of information, including top-level commanders, need minimal or no training beyond familiarity with the browser interface because of the simplicity of the KWeb design for information displays.

KWeb was implemented on board the USS Carl Vinson during its deployment to Operation Enduring Freedom; it was found to be extremely valuable in assisting information producers and users with the transformation of data into information — and information into knowledge.

In the conventional sense, the operational construct of Composeable FORCEnet provides the ability to conduct and coordinate operations efficiently and effectively. This means warfighters or an organization can: (1) Collaborate with anyone, anywhere, anytime; (2) Allocate bandwidth according to mission priorities



*The CFnHSI has the ability to assess and evaluate human performance effectiveness in new and modified systems and applications. The lab supports HSI compliance within FORCEnet and serves as a means to transition human-centered R&D from laboratories to the fleet.*

for particular information, applications or individuals; (3) Define the quality of service standards; (4) Show when and where sensor coverage is needed, and see the coverage and resulting sensor products; (5) Tailor information requirements and presentations to support missions; and (6) Put the right weapon on the right target with speed and precision.

Composeable FORCEnet can also provide the backbone for: quality of life improvements; medical treatment; logistics management; training and education; innovation and experimentation; and navigation. Thus, it is capable of supporting the CNO's supporting triad of organizational processes for Sea Power 21: Sea Warrior, Sea Trial and Sea Enterprise.

As operational commanders of Navy forces build their own, personalized, warfighting systems, it will likely drive these same individuals to put specific demands on the engineering community for future instantiations of FORCEnet, enabling operators and engineers to better communicate on what is, arguably, one of warfighting's most important issues: How to deliver the right information — at the right time — to the right people, while preventing an adversary from gaining access to the same information.

Ultimately, it is the naval and joint warfighter, not the engineer, who will use the capabilities needed for the immediate operational and tactical problem. SSC San Diego research suggests that warfighters operating in a Composeable FORCEnet-enabled environment will soon be able to compose the C4ISR components developed by the engineering community at their discretion to ensure superior decision making.

This capability can enable the joint force commander to achieve the maximum degree of operational effectiveness across the entire spectrum from warfighting to peacemaking — and to do it faster than ever before. FORCEnet can enable command and control constructs that are limited only by the operational and tactical imagination of the commander. 