



# DEFENSE.info

## Visiting the USS Gerald R. Ford, October 2020



By Robbin Laird  
October 2020

<b><u>THE INTEGRATABLE AIR WING AND RE-IMAGING THE LARGE DECK CARRIER: THE COMING OF THE USS FORD</u></b>	<b><u>3</u></b>
<b><u>THE COMING OF THE USS FORD: LOOKING BACK</u></b>	<b><u>4</u></b>
THE FORD CLASS CARRIER, THE F-35C AND THE “SPIDER WEB” WAR AT SEA	4
THE PERSPECTIVE OF CAPTAIN JOHN MEIER, 2015	6
<b><u>BUILDING BLOCKS ON THE USS FORD: WEAPONS WORKFLOW AND ENHANCED SORTIE GENERATION RATE</u></b>	<b><u>10</u></b>
<b><u>BUILDING BLOCKS ON THE USS FORD: RESHAPING THE FLIGHT DECK AND OPS TEMPO</u></b>	<b><u>15</u></b>
<b><u>THE USS FORD, MANEUVER WARFARE AT SEA AND ITS C2 INFRASTRUCTURE</u></b>	<b><u>19</u></b>

# The Integratable Air Wing and Re-imaging the Large Deck Carrier: The Coming of the USS Ford

On Friday, October 9, 2020, I had a chance to visit the USS Ford and to get an update on the progress of this formidable warship.

Earlier, Ed Timperlake and I have visited the USS Ford in 2015 and discussed the next generation large deck carrier with the ship's captain, John Meier. Now Captain Meier is Rear Admiral Meier, Commander, Naval Air Force Atlantic.

This article provides an overview for a series on the strategic context into which the USS Ford is entering and the reshaping of how the large deck carrier will operate with the integrated distributed force.

I will provide a series of articles looking at specific aspects of the ship which make it a next generation carrier and will highlight the discussions onboard the ship during my visit about those various aspects.

Although the USS Ford draws on the generations of experience operating large deck carriers, the USS Ford is no more a Nimitz class replacement than the F-35 is a replacement for legacy aircraft.

The ship has a number of capabilities which allow it to have substantial increases in sortie generation rates which allows the ship to deliver mix and match force packages into the expanded battlespace.

And these capabilities will work differently with the fleet, understood more broadly, as inclusive not only of the Navy but with the US Air Force and Marine Corps as well.

The airwing of the future understood as the integratable air wing, new approaches to working fleet wide combat integrability, enhanced capabilities to work with the various elements of the joint and coalition forces more effectively, reworking blue water expeditionary operations, and shaping kill web dynamic targeting options, all provide the strategic context within which the USS Ford will operate.

**In other words, it is not just a new ship; it is a new blue water capability empowering maritime and air power to operate in ways symmetrical with the challenges of full spectrum crisis management.**

As such, the ship will benefit from the various force structure changes which the United States and its allies are generating but it will also drive further changes in concepts of operations and capabilities as well.

In many ways, it is an untold story.

For most discussions of the USS Ford have revolved around the new systems onboard the ship; not what those capabilities enable both for the fleet and the joint and coalition force, and, in turn, how those capabilities enable the new ship to leverage innovations being shaped for operations in the extended battlespace by the joint and coalition forces.

This series will provide an initial attempt to shape that narrative and that story.

## **The Coming of the USS Ford: Looking Back**

Ed Timperlake and I highlighted the coming of the USS Ford in a series of interviews over the past few years.

I would like to highlight two of these prior to focusing on my visit this month to the USS Ford.

The first was with the newly appointed head of Naval Aviation, Rear Admiral Moran, who later became the Vice Chief of Naval Operations.

Next we visited the USS Ford in Norfolk in 2015 to have our initial tour, and a wide-ranging discussion with the ship's captain, now Rear Admiral John Meier

## **The Ford Class Carrier, the F-35C and the “Spider Web” War at Sea**

In a piece we first published on *Breaking Defense* on May 15, 2013, we published our interview with Rear Admiral Moran.

An aircraft carrier is nothing without aircraft, and a Navy aircraft is worth little without a carrier. It's ships and planes in synergy that revolutionized war at sea in the 1930s and with new systems now entering service – the F-35C Joint Strike Fighter and the Ford-class carrier – they can do it again.

On April 30, 2013 we sat down with Rear Admiral Bill Moran, the Director of Air Warfare on the Navy staff (OPNAV N98)....

While the new carrier can still perform its traditional role as the centerpiece of a mobile island of concentrated naval force, Moran said, the Ford class, the evolving air wing, and an array of other new capabilities will allow the carrier to play a much more flexible and distributed role....

“We are looking at a number of evolving technological developments and options to shape the naval air wing after next. Unfortunately, some people misunderstand this approach and think we are looking at future technologies to displace what we are buying now, including the F-35 in the near term. In fact it is just the opposite.

“We are going to operationally shape our understanding of the evolving air wing, notably as the F-35 enters the fleet, and build from that to the air wing after next.

“The CNO has highlighted the role of payloads in shaping the kinds of platforms we are buying and likely to develop and buy.

“We think that in Naval aviation we are building out in that manner with the new Gerald R. Ford class of carriers (future platform) married with evolving air wing capabilities (payloads).

“Another good example is the new P-8 Poseidon, which was design built from a commercial airframe. We then put architecture in the airplane to allow growth in terms of what capability will fit into that airplane in the future.

“This kind of “truck” and “payload” construct buys us time to evolve capability, whether it’s weapons or sensors or communications gear that are more easily integrated into the backbone of that airplane.

“When we think of strike fighters for the carrier wing after next, shaping a combat truck in effect will play a role. It might be a truck that has a common architecture, a backbone to it that you can plug and play different capability sensors, weapons, comms, and that will drive design and it will drive propulsion.

“It will also have the reach and reach back to operate in multiple environments and will have payloads on it that will enable future weapons that we see that are smarter, more precise, and will be a bit unpredictable for potential adversaries, whoever they might be....”

**Question: You have been talking about the evolution of the air wing, but you clearly have in mind that the new large deck carrier will be part of the re-shaping of what that air wing can be used for. Could you talk about your understanding of the Ford and its capabilities?**

Moran: “Because it’s an “electrified” platform — it’s no longer predominantly steam and hydraulics and all of the things that are traditional parts of the Nimitz-class carriers — we’ve replaced a lot of that with electrical capability because of improved power generation coming out of a newly designed nuclear power plant.

“It’s a generational leap in capability in terms of generated power.

“Ford will generate three times the electrical power of a Nimitz class carrier. And with that you can electrify the ship and you can automate the ship, add the most powerful and advanced radar system in the Navy and then when you want to put things on the ship, new capabilities in the future that we can’t even think of today, whether it’s a hypersonic capability that’s unmanned, directed energy weapons, or whatever it is, we do know is it’s got to be able to plug in. It’s got to fit in somehow. And, it’s going to need power.

“With a ship that is in effect a 21st century infrastructure for 21st century systems, we will be able to do that.

“Whatever we invent, whatever we want to put on this truck in the future, it is going to be able to incorporate it in a way that the current configuration cannot.

“We have also reduced the crew size and designed the ship for reduced maintenance, thereby reducing operational costs over its lifetime by four billion dollars.

“The Ford class, will introduce significant design improvements in flight deck sortie generation capability.

“It’s cleaned up significantly. We’ve developed in effect a pit crew concept where there’s enough room when an airplane lands that you can pull it off into the pit and reconfigure it, whether it’s sensors or weapons, and gas it, and put it right back out on the deck and launch it.”

**Question: You are describing a carrier which can operate much more flexibly than a traditional carrier, and one which can become a central piece in a combat “spider web,” rather than operating at the center of a concentrated force.**

**Could you talk to the con-ops piece of this?**

Moran: “The Ford will be very flexible and can support force concentration or distribution. And it can operate as a flagship for a distributed force as well and tailored to the mission set.

“When combined with the potential of the F-35, Ford will be able to handle information and communications at a level much greater than the Nimitz class carriers.

“People will be able to share information across nations, and this is crucial. We call it maritime domain awareness, but now you’ve included the air space that’s part of that maritime domain.

“There is another aspect of the Ford, which is important to handling the information systems as part of the evolution of the fleet. We’ve never really talked about the cooling aspects. But if you go down to Newport News and take a tour of the Ford, right now, one of the things they really like to brag about is innovations in the cooling system. All of us know the processing power takes its heat.

“And so, you’ve got to be able to cool it. Ford more than doubles the cooling system capacity of a Nimitz-class carrier.

“But let me close by circling back to the future of the air wing for the next 20 years and the value we see in the F-35C....

“Once we marry up F-35C with key capability investments in the Super Hornet, E-2D, [EA-18G] Growlers, and a mix of unmanned capabilities, we will continue to have an air wing that can dominate in any environment.”

## **The Perspective of Captain John Meier, 2015**

As Captain Meier put it to us during an interview at Newport News shipyard on January 9, 2015:

“We share the same hull design in this class carrier with the Nimitz but everything else is either heavily modified or completely new.”

In effect, the new carrier is built to provide an infrastructure for 21st century warfighting, not just for the U.S. Navy, but for the joint and coalition force as well.

The ship is designed to operate more effectively with an evolving airwing, which will change over the 50+ year life of the carrier.

It has as well significantly greater C2 capabilities so that the carrier can play an expanded role in evolving 21st century U.S. and alliance distributed operations which will be central to U.S. warfighting capabilities going forward.

The significant increase in electric power generation, three times greater than Nimitz, is designed to allow the electronic systems associated with defense, attack and C2 to grow over time as well.

A number of the changes associated with the ship are quite visible: the new launching and recovery systems, the weapons handling system and many other improvements.

For example, an important safety and damage control issue is independently generating steam in a modern galley, which precludes steam lines running through the ship. Another example is the special application of non-skid coatings, which means less upkeep.

All of these changes are significant and important.

As Captain Meir noted: “Clearly, the ship is designed to enhance the sortie generation rate of the airwing.

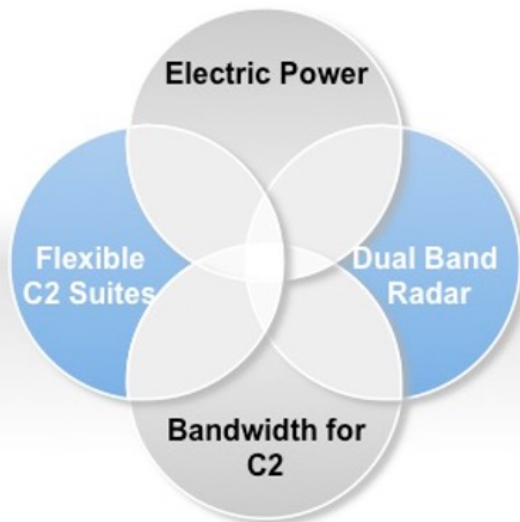
“But, less noticeable, is that the Ford is a vastly improved command and control platform as well.

The new phased array radars are going to be the most capable ones on the water. They will open up a window on new levels of C2 and new ways of fighting and communicating and controlling communication flows.”

In the graphic below, the key elements of the infrastructure enabling the Ford to become a unique C2 asset for the maritime or joint or coalition force.

# USS Gerald Ford: Reshaping C2 at Sea

The FORD Class can function as the brain of a coalition or joint strike force



## Electric Power

Significant Electric Power Generation; Upgradeable Super Computer Baseline: New Energy Weapons

## Dual Band Radar

Active Sensor Technology with Dual Band Radar; Capabilities for Evolving Threat Environment

## Significant Increase in Bandwidth

21<sup>st</sup> Century Consules, Command Systems and Increased Bandwidth

## Reconfigurable C2 Suites

Rapidly Reconfigurable Command Suites for Joint or Coalition Partners

The super computers onboard the ship, with the power to support them as well as having significant power available for system cooling along with the deployment of future laser weapons is a crucial baseline for building out of C2 capabilities.

The next generation in active sensor technology in the dual band radars provides a solid foundation, not simply for the organic defense and strikes capability of the carrier, but for the battle fleet as a whole.

Significant increase in bandwidth is a fundamental requirement for an expanded C2 capability at sea which can support land, sea and air operations.

And the unique rapidly reconfigurable command suites on board allow for C2 to be provided for joint or coalition partners in a manner appropriate to the mission set.....

*During the interview Captain Meier discussed a wide range of issues, but will close this section of the current article by pulling in his response to one of our questions during that interview.*

**Question: What you're basically saying is the Navy is enhancing its ability to be able to launch different types of aircraft because you're not constrained by a catapult system that has to be resized for each aircraft coming out of the launch.**



**So you can mix and match packages appropriate to mission set.**

**Could you comment on this development?**

Captain Meier: “Your point is absolutely right on.

“That also goes to not just launch and recovery of aircraft, but the types of ordinance that’ll be happening 30, 40, 50 years from now as well will change dramatically.

“We anticipate directed energy weapons being onboard the ship, and a significant evolution of the weapons carried by the carrier.

“The new weapons handling system is designed to be able to handle the weapons of the future as well.

“You have a great capacity for diversity of weapons, and the advanced weapon elevators themselves are located on the ship to facilitate faster movement and loading of the weapons. That’s the underlying principle of the advanced weapon elevators.

“The elevators carry more weight and they go faster, twice the speed and twice the weight essentially of the legacy weapons elevators.

“They’re located in the flight deck, which puts them positionally where the crew will spend a lot less time from an ergonomics perspective pushing the ordnance around.

“The ordnance comes up right near the aircraft and facilitates more efficient weapons loading.

We closed by discussing the USS Ford in terms of its flexible infrastructure enabling enhanced warfighting capabilities.

**Question: The power generation and cooling, and the computer-based capabilities of the ship coupled with the new radars clearly create a foundation for the evolution of C2.**

**But what is not widely realized, and we certainly did not before coming onboard the ship, is the impact of what you call flexible infrastructure.**

**Could you explain what this is and what its impact might well be?**

Captain Meier: “Flexible infrastructure is a part of the ship built with reconfigurable work areas. Imagine this part of the ship as offices with movable walls where you could set up workspaces how you want them to operate for the task. And you have electrical power in this space to use as you wish.

“These spaces can be configured appropriate to a particular C2 scenario whether for the USN, the joint or coalition force onboard the ship.”

# Building Blocks on the USS Ford: Weapons Workflow and Enhanced Sortie Generation Rate

The USS Gerald R. Ford (CVN 78) can be viewed as a key infrastructure piece in the reshaping of air-maritime combat capabilities, and not just for the US Navy.

From this perspective, my visit to the USS Gerald R. Ford (CVN 78) on October 9th, 2020 allowed me to focus on three key elements of the ship which provide for new combat infrastructure: weapons workflow, deck workflow and C2/ISR mission management.

In this article, I will focus on the weapons workflow, and its impact on sortie generation rates.

But I will discuss as well how the approach enabled by the USS Gerald R. Ford infrastructure delivers more than much higher sortie generation rates, as important as that is.

**It also builds in capabilities to embrace the weapons revolution, and the capability of the USS Gerald R. Ford to embrace a wide range of multi-mission mix and match capabilities to support the multi-domain force.**

I had the privilege of spending time in the morning of October 9th, with Rear Admiral Craig Clapperton, Commander Carrier Strike Group 12, Capt. J.J. Cummings, Ford's Commanding Officer, and USS Gerald R. Ford's Ordnance Handling Officer, Lt. Cmdr. Paul Castillo.

**But before I discuss the combat outcomes, let me address what I mean by the weapons workflow.**

As we toured the ship and focused on the key elements which allowed for a very different weapons workflow from the Nimitz class carriers, we had a chance to discuss not only that workflow but its intersection and impact with other key developments for the USS Gerald R. Ford in the context of the evolving combat force.

There are several elements of the workflow shift for weapons.

On a Nimitz class carrier, there is a "weapons farm" on the ship's flight deck from which weapons are worked for assembly and worked with components brought from various levels of the ship and then transported by a hydraulic system which pulls the elevator up with wires and ropes. The weapons need to be moved through one of the two mess decks before being transported on deck.

And prior to loading the weapons onto the aircraft, there is the challenge of finishing the weapons preparation prior to weapons loading.

**This process changes onboard the USS Gerald R. Ford.**

Below the flight deck are two very large weapons assembly and loading areas, where the weapons are prepared to be transported to the flight deck for loading onto the aircraft. These two large areas allow

the ordinance team to prepare weapons of various complexity out of the weather, which makes the process much more rapid and safer.

And it is clear when one stands in these “weapons handling transfer areas,” that the ship will be able to accommodate the various new weapons which during its lifecycle which will be developed, built and delivered to the US Navy.

**In other words, it is better now for today’s arsenal and has significant capability to support the weapons revolution underway.**



There are two of these weapons handling transfer areas as compared to a single weapons farm on a Nimitz class carrier.

It is also clear, that the new carrier will be able to operate with significant capabilities to support multi-mission operations.

There is enhanced capability for the crew to build diverse weapons packages below deck and then to transport them rapidly to the flight deck for loading. This will give the ship the ability to mix and match flight strike packages or even ISR packages much more rapidly.

As Rear Adm. Clapperton put it: “We can move more weapons in a safer way, a faster way to a flight deck that is larger and more flexible.

“And that all contributes to the kind of agility, lethality, and flexibility the Ford brings to the fight.”

A key outcome of the new weapons workflow is significant increases in sortie generation rates.

The Ford's Ordnance Handling Officer, Lt. Cmdr. Paul Castillo highlighted the importance of moving from a weapons farm centered weapons generation workflow to operating from two areas below the flight deck for complete assembly of weapons.

This means that these weapons can then be loaded directly on to the new weapons elevators and delivered to the flight deck for immediate loading on the combat aircraft.

According to Lt. Cmdr. Castillo: "We have reduced time significantly from the time we build the bomb to the time we put it onto the combat aircraft. We have four flight elevators to the flight deck and this allows us to do it much more safely as well."



Lt. Cmdr. Castillo to the left, Rear Admiral Clapperton in the middle and Capt. JJ Cummings to the right.

Capt. J.J. Cummings added that the NASCAR loading approach which was highlighted the last time we visited the USS Gerald R. Ford in 2015 was facilitated by the weapons workflow we were discussing.

"We have a significant increased ability to get the aircraft launched off the flight deck fully loaded with ordnance appropriate to the mission."





Capt. J.J. Cummings to the left in the hangar bay.

This workflow and the other modifications for flight deck operations are changing how the metrics for USS Ford versus USS Nimitz performance should be measured.

As Rear Adm. Clapperton put it: “We are working with Carrier Strike Group Four, the group which certifies when a strike group is ready for deployment.

“We are working with them to determine realistic and reasonable measures applicable to Ford versus Nimitz class.

“What are the metrics for launch and recovery, for ordnance delivery, for sortie generation, and weapons employment that we are going to use for a Ford class carrier versus a Nimitz class carrier?”

He also added a key point with regard to speed to deliver of multi-mission impact: “Clearly, we can more rapidly support multiple options, from ASW, to fleet defense, to surface warfare, to information warfare or air to ground.



Rear Admiral. Clapperton on the right in the hangar bay.

I would call this a speed to deployment metric as well as speed to reconfigure for mission packages metric, both of which are facilitated by the new weapons workflow as well as the deck operations workflow on the USS Ford.

For me, what the USS Gerald R. Ford class will enable is a much more rapid speed to deployment and to do so with an ability to arm the aircraft for a wide range of missions.

One of the points I will make in a later piece is that as the integrated distributed force evolves and the capability to operate in and to empower multiple kill webs widens, a key capability for the large deck carrier will be to be able to support multiple kill webs from its integratable air wing.

In a discussion I had earlier this year with a navy analyst we discussed this approach.

“The carrier strike group battlespace has gone from being the where engagements occur to a situation in which the carrier strike group itself becomes a piece on the larger chessboard, which will be from a Navy perspective, be managed at the numbered fleet level.

“Because of the sensor and communications technologies and the weapons evolution, the chessboard is bigger, and the large deck carrier is feeding into the interactive kill webs through which we operate on that chessboard.

“The numbered fleet becomes the command and control node, which is why we are seeing the numbered fleets standing up maritime operations centers that we did not have before. The size of the

chessboard is enlarging significantly, with kill webs, that can stretch for thousands of miles, when you add in things like Triton or satellites.”

**In other words, the large deck carrier and its partnered assets are moving beyond a focus simply on its proximate operating area to supporting a larger region, to be understood in terms of the size of the numbered fleet.**

It is very clear that the USS Ford will provide very effective infrastructure for such an approach.

## **Building Blocks on the USS Ford: Reshaping the Flight Deck and Ops Tempo**

In the previous article, I looked at one key building block which enhances both the ops tempo of the strike package on the USS Gerald R. Ford as well the flexibility of the weapons packages which can be moved to the flight deck and loaded on the strike aircraft.

This is a key input into a significantly redesigned flight deck workflow which allows for a much more rapid turnaround of the launch and recovery of aircraft as well as more flexibility operating and arming the strike packages.

My flight deck visit was facilitated by Ford’s Top Catapult Officer (TOPCAT), Lt. Cmdr. Andy Kirchert and by Aviation Boatswain’s Mate (Fuels) 2nd Class Thomas Drew Watson (from Winona, MS).

Insights throughout with regard to the impacts of the workflow on operational tempo and combat impacts were provided by Lt. Christopher Warzinski, CSG-12’s Joint Interface Control Officer, Rear Adm, Craig Clapperton, Commander Carrier Strike Group 12, and by the USS Gerald R. Ford’s (CVN 78) Commanding Officer, Capt. J.J. Cummings.

A major difference can be seen right away when one steps onto the flight deck. Next to the USS Gerald R. Ford (CVN 78) during my visit was the USS John C. Stennis whose flight island can be seen in the rear of this photo.



The island on the USS Gerald R. Ford has been moved 140 feet aft and is 30% smaller. What this allows is significant additional space for aircraft refueling and weapons loading operations, with the area forward of the island able to accommodate more combat aircraft.

During flight operations, Ford's design increases the amount of usable space forward of the island and reduces the amount unusable space aft.

As the ship's captain, Capt. J.J. Cummings, put it: "If you think of the ship as a gun, and the strike force as bullets, then we have increased the size of the clip because we can load it with more bullets because of the island being further aft on Ford versus Nimitz."

The clam shell form factor for the weapons elevator flight deck hatches also open with minimal flight deck interference.





There is more operational space on the USS Gerald R. Ford's flight deck and the new launch and landing systems as well as a significant redesign of how refueling is done on the flight deck provide key tools for a significant reshaping of the operational tempo for the large deck carrier.

The new launch system allows for a wider range of aircraft to operate from the carrier; the new arresting gear system can recover them. The ability to mix and match the current air fleet and the future one is significantly enhanced with EMALS. The launch system has a larger aircraft weight envelope that exceeds what is available with steam, so EMALS can launch very light aircraft or heavy aircraft which means this system can accommodate future manned or unmanned aircraft.

The same flexibility exists in the Advanced Arresting Gear with larger current operating wind and weight envelopes and the capability to recover future aircraft designs with minimal modifications required.

The refueling system is designed to keep a clear path to the catapult by reducing flight deck obstructions caused by refueling hoses, weapons skids and weapons elevator access points. This highly efficient flight deck flow allows for the FORD to sustain higher launch and recovery rates.

Let me turn to each of these capabilities which add up to a new workflow on the deck which provides for a more rapid pace of ops tempo and more flexibility to mix and match mission packages as well.

Much of the press about USS Gerald R. Ford has been about its launch system, the electromagnetic aircraft launch system or EMALS.

I discussed this system at some length with Lt. Cmdr. Andy Kirchert. There are several advantages of the system over the legacy steam catapult system which he highlighted.

First is the flexibility and adaptability of the system. The EMALS system has more room for growth for future aircraft systems. Steam will not be able to shoot super light aircraft and it can shoot heavy aircraft but that is serious wear and tear on the CAT when it shoots heavy shots. Heavy/light shots not an issue at all with EMALS.

Second, the new system has reduced manning requirements for the launch function. There is reduced manning by 50%.

Third, longer fly days are enabled due to reduction in the pre-flight and post flight procedures. For example, steam catapults require a heat up to be ready for launch

Fourth, the system is easier on aircraft which should lead to reduction of stress on the aircraft due to launch. The system delivers very precise endspeeds for the launch process.

Fifth, the system delivers enhanced safety margins. The system will not allow launch of an aircraft if it sees something wrong in the process.

Obviously, there have been challenges with the system, but the Ford team is overcoming those challenges, but according Lt. Cmdr. Kirchert, “We are in the fine-tuning phase.”

One might note that both the French and Indian navies are lining up to procure EMALS which suggests confidence in the system.

The counterpart to the EMALS is the Advanced Arresting Gear system which provides capabilities to recover the current fleet of aircraft in environmental conditions that exceed what is possible with the Nimitz class system

And similar to EMALS, AAG is designed to have the ability to operate with aircraft of varying weights, including future aircraft systems. When one visits the Advanced Arresting Gear system below deck, it is amazing to see how automated it is and how little manpower is required to operate it as well.

The refueling system is a major aspect of the redesign of workflow on the flight deck. My guide to this aspect of the ship was provided by Aviation Boatswain’s Mate (Fuels) 2nd Class Thomas Drew Watson. Post flight, aircraft are parked along two isles for refueling – one on the deck edge and the other just outside of the landing area. This parking arrangement allows unobstructed access to the catapults.

The in deck refueling stations which are unique to the Ford keep refueling hoses out of the taxi paths to the catapult. (refueling stations which can refuel two aircraft at the at those stations.

This has a major impact because on the Nimitz the refueling crew has to carry several, lengthy connected fuel hoses which are heavy from the starboard side of the Nimitz class to do mid-deck refueling. On the Ford, the hoses are right there beside the in-deck refueling stations and rather than having to have a crew of 5 people to bring the hoses 150 feet to mid-deck and do refueling, you only need two crew to man the in-deck refueling stations.

Lt. Cmdr. Kirchert emphasized that the sensors that make up the system and the software which manages them have posed development challenges in the past, but that NAVAIR and General Atomics have worked effectively to provide for the software changes necessary to allow the system to function effectively. And many of the software changes are quickly phased into the system between underways.

Also in common with almost all new systems, parts failures have emerged which were not anticipated but those parts are being rebuilt to provide for better performance as well.



My topside visit ended with a discussion with by Rear Adm. Clapperton.

He underscored that the USS Gerald R. Ford was going to be a key enabler for the maritime distributed force which the Navy was envisaging as its way ahead for the fleet.

With an ability to provide flexible strike options to the fleet, and a capability to support new weapons, and new aircraft, the new generation carrier was a key infrastructure to support the way ahead facing the U.S. Navy, the joint and coalition force.

## **The USS Ford, Maneuver Warfare at Sea and Its C2 Infrastructure**

Much like a visit to the USS America reveals the importance of having a three-deck large deck amphibious ships to its con-ops, one has to go below deck of the USS Gerald R. Ford to visit the C2/ISR management deck, as I would call it, to see why the USS Gerald R. Ford is being built to anchor the way ahead for 21<sup>st</sup> century maneuver warfare at sea.

The command deck can be viewed as an important upgrade over the Nimitz class super carriers; but when considered in terms of the transformation of the fleet into an Integratable distributed force

operating through interactive kill webs, the command deck is an enabler of the way ahead, and a beneficiary of the C2/ISR revolution underway.

My visits to NAWDC highlighted the shift of focus from a legacy approach to air wing training for the integrated air wing to a much wider focus on how aviation was interacting with a much wider fleet and joint/coalition force evolution. My discussions with Vice Admiral Miller, the recently retired Navy Air Boss, highlighted the emergence of what one might call the integratable air wing which is a carrier air wing operating in mission packages which can work with the distributed force to deliver an integrated combat effect.

The command deck on the USS Gerald R. Ford is an expression of this change.



Clearly, the USS Gerald R. Ford is coming to the fleet, as the fighting Navy refocuses and blue water operations and blue water expeditionary operations. At the heart of such a return is maneuver warfare at sea. The U.S. Navy has clearly done this before but is now doing so in the context of new technologies, and new joint and coalition capabilities. It is being done so in the build out of the integrated distributed force able to shape combat effects through combat effects across that force.

The command deck and capabilities onboard the ship are significant. I had a chance to tour those decks with Rear Admiral Clapperton and CSG-12's Information Warfare Commander, Capt. Steve "Shep" Shepard. What one could experience was a much more significant working area for mission planning, and to incorporate a numbered fleet as desirable or joint force command elements as well.

My own sense is that the coming of the U.S. Air Force's B-21 and the Ford class carrier provide a golden opportunity to shape a significant new combat capability, and a B-21 command element could sit right in the Ford's mission planning area to work that kind of integrated combat effect in real time. The B-21 could operate as the Ford class carriers wing man or the Ford could operate as the B-21s wingman.

What is clear is that with the power generation systems and the cooling systems onboard Ford, the ship can accommodate the evolution of technology onboard the ship, and above all the evolution of computational power and digital technology. Ford has only about half of its power capacity being taken up and as such the ship can incorporate new weapons systems whether directed energy whether it is a new C2 system whether it is new wave forms to operate in a denied environment. Ford has taken the lessons learned over decades of experience for the Nimitz class with regard to command at sea — how to share information across the fleet — how to use the IW commander as the integrator of all those other warfare commanders and is harvesting those lessons learned.

Capt. Steven Shepard is a key member of the team standing up Ford for its first deployment. This means, as Rear Admiral Clapperton put it: “As a Strike Group, we are building IW into the ship from the ground up, and Shep and his team are working our mission planning and C2 systems with an eye to enhanced IW capabilities which can be delivered by the ship and interactive with the fleet and the joint force.”

Notably, the two officers served together towards the end of the Cold War, and that memory is also an anchor point to building out the Ford for the peer competitor world.

We walked through together the mission planning spaces onboard the ship. One could see how the spaces are optimized and positioned in a better way to enable those warfare commanders to work together and to allow for additional services partners allies to also incorporate directly on the Ford and then to share that level of understanding and that level of awareness with those partners and across the strike group.



Rear Admiral Clapperton noted: “The Ford is well positioned as we move into this future where an aircraft carrier and the strike group can be considered enablers of other weapon systems. We can function as an integrator of all of those capabilities, or as enabler of the fleet and joint assets, but equally benefiting from the joint capabilities operating in the extended battlespace.”

The ship also has a number of reconfigurable mission planning bays. These bays can accommodate systems across the spectrum of classification. This means that the challenge of operating across the spectrum of crisis management can be managed by partners, allies or U.S. joint force elements onboard the ship as well.

Taken as a whole, this means that “we have more flexibility for the missions we do and more flexibility for evolving technologies to meet the changing security environment,” according to the Rear Admiral.

He then described how he viewed the capabilities of the ship to deliver more effective integrated operations.

“When you get into mission command scenario and when you get into a coms denied environment scenario where the commander forward needs to make real time risk decisions, there is no time to go back to a mother may I kind of C2 process. We need platforms like this which enable coordination in such an environment.

“If we want to do naval integration, with the command space we have on Ford, we can, for example, bring onboard the command element for an expeditionary task force or expeditionary strike group. We can liaison with them and put them right there in the command suites next to the guys who do surface and underwater warfare for us. They could be working hand in glove to ensure complete integration of the maritime domain awareness picture. We could have those people sitting side by side working those issues making sure integration is happening.”

The discussion with Capt. Shepard – a third generation military officer with more than 30 years of experience in the U.S. Navy -- highlighted the expanded role for IW as part of the carrier maneuver warfare approach. And in that approach, we discussed the coming of the new Maritime Intelligence, Surveillance, and Reconnaissance (MISR) officers as well. He argued that the role of carrier maneuver was to provide flexibility to respond to threats. It is to create uncertainties for adversaries, and clearly IW and combat in the electro-magnetic spectrum is a key part of that effort. All of which means that ability of the C2/ISR deck as I like to call it is a key part of the warfighting capability of the ship.

While it is much cooler watching aircraft take off from the deck, many of the decisive effects delivered by a Ford-led task force will be delivered in the spaces below deck. Capt. Shepard sees the creation of the Information Warfare Commander (IWC), a warfare commander equal to the Air Wing and Destroyer Squadron commander, as critical to the Navy in operating and managing the Information Warfare domain in Great Power Competition. Additionally, the coming of the MISR officers as part of the expansion of the kind of situational awareness which allows for more effective maneuver warfare at sea.

As Rear Admiral Clapperton put it: “Much like the F-35 makes the other fighters more survivable and more lethal, the Ford will make the entire fleet more survivable and more lethal. The direction we need to take the ship is leveraging advances in situational awareness to empower the fleet.”

The intersection between what the USS Gerald R. Ford enables in terms of the new capabilities built into the ship, and the new workflows enabled by those capabilities and how it benefits from the C2/ISR revolution underway in the fleet and the joint/coalition force is the focus of our forthcoming book with USNI press.

I will conclude with a comment which was generated by a visit with Vice Admiral Miller this past July in his office in San Diego.

“With Vice Admiral Miller, we discussed how the new Ford class carriers can operate quite differently from the Nimitz class. With three times the onboard power systems, new C2 capabilities, an ability to host directed energy weapons, and to configure C2 cells differently, the USS GERALD R. FORD (CVN 78) conducting blue water operations could operate as a key epicenter for supporting multiple kill webs or reintegrating into a tightly integrated defensive force dependent on the evolving combat situation.

“The rethinking of the operations the L-class ships and of the large deck carrier, as part of a wider set of interactive kill webs, are topics to be discussed in future articles, but the work which is unfolding



under the Air Boss and in the naval aviation community (remembering that the Marines are key players in that community) clearly is underwriting new ways to work the fleet.”

**Note: I would like to thank the work and support of the Public Affairs Officers most responsible for making this visit possible, CDR Jennifer Cragg, Force Public Affairs Officer, Commander, Naval Air Force Atlantic and LCDR Desiree Frame, Public Affairs Officer, USS Gerald R, Ford (CVN 78).**